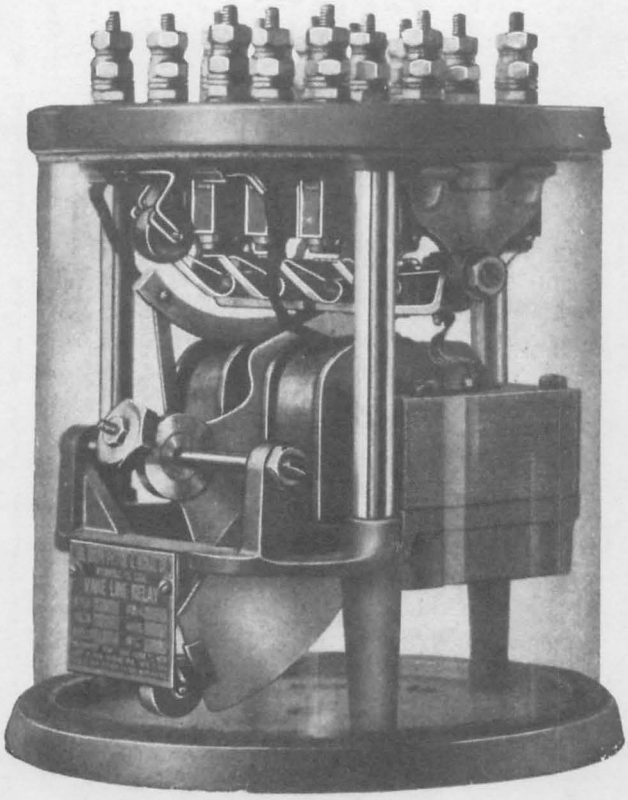
PLATE E-1005

UNION SWITCH & SIGNAL CO.



Dia. 8", Height 10"

STYLE SLV-13 VANE RELAY

The Style SLV-13 Relay is wound for any standard frequency, and any voltage from 0.7 to 250.

It is recommended as a *track* relay on single or double-rail non-polarized sections up to approximately 2000 feet, the exact length being dependent upon contact equipment, ballast leakage, bonding, frequency, etc. On longer track sections the Model 15 (two-element) Vane is more economical. *The SLV-13 Track Relay is especially recommended for detector circuits*, as its action is quick and positive.

When wound for service as a *line* relay, it is sufficiently slow-acting to bridge the reversal of either a three-position Vane or Galvanometer Relay.

The maximum contact equipment of the SLV-13 relay is 8 contacts divided in any desired way between front and back except that not more than 7 back contacts can be furnished.

UNION SWITCH & SIGNAL CO.

STYLE SLV-13 VANE RELAY

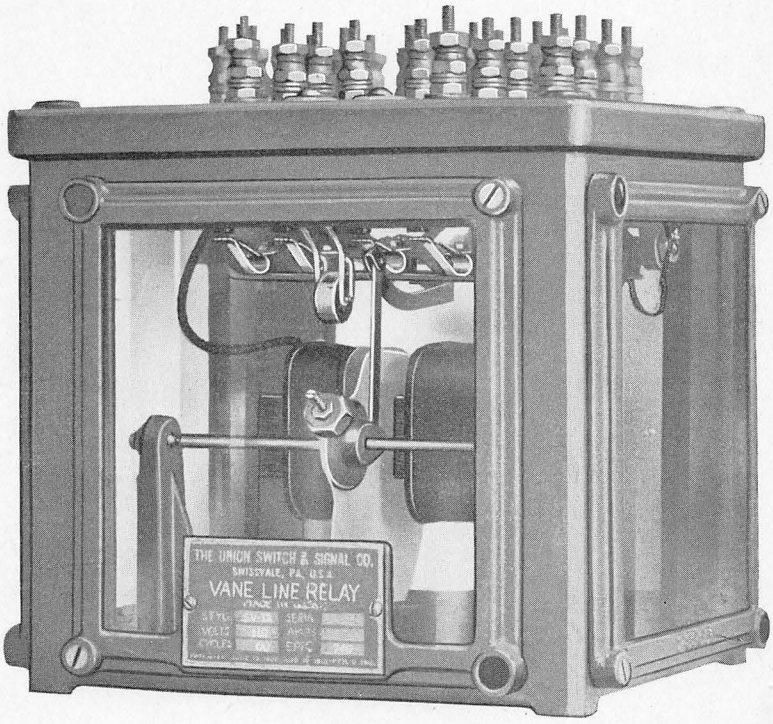
Order by Plate, Piece, Reference and Description

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
	A	Style "SLV-13" Vane Line Relay, complete (Orders must specify Voltage and Frequency of alternating current available, and number of front and back contacts required. Unless otherwise specified front and back contacts will be non-independent).....	C-4194-13
	B	Style "SLV-13" Vane Track Relay, complete (Orders must specify Voltage and Frequency of alternating current available, and number of front and back contacts required. Unless otherwise specified front and back contacts will be non-independent).....	C-4194-13

PLATE E-1015

UNION SWITCH & SIGNAL CO.



Height $10\frac{1}{2}''$, Width $9''$, Depth $10''$

STYLE SV-12 VANE RELAY

The Style SV-12 Relay is wound for any standard frequency and voltage up to 250. *It is recommended for use only where a single-element relay of contact capacity greater than is provided by the Style SLV-13 Relay is required.*

As a *track* relay it may be used on single or double-rail non-polarixed sections up to approximately 800 feet, the exact length being dependent upon ballast leakage, bonding, frequency, etc. On longer track sections the Model 15 (two-element) Vane is more economical. The action of the SV-12 Relay on detector circuits is quick and positive.

UNION SWITCH & SIGNAL CO.

STYLE SV-12 VANE RELAY

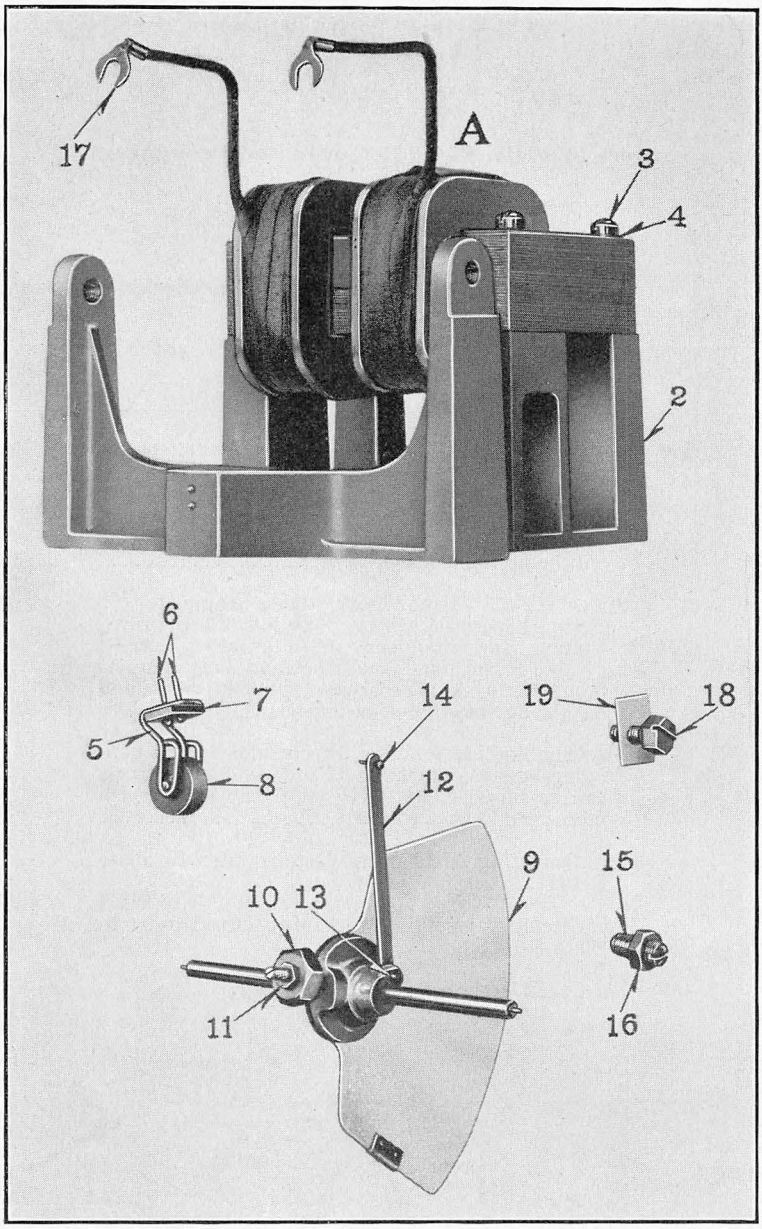
Order by Plate, Piece, Reference and Description

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
	A	Style "SV-12" Vane Line Relay, complete ($\frac{1}{2}$" Radius Operating Crank) (Orders must specify Voltage and Frequency of alternating current available, and number of front and back contacts required. Unless otherwise specified front and back contacts will be non-independent)	C–8813–11
	B	Style "SV-12" Vane Track Relay, complete ($\frac{1}{4}$" Radius Operating Crank) (Orders must specify Voltage and Frequency of alternating current available, and number of front and back contacts required. Unless otherwise specified front and back contacts will be non-independent)	C–8813–11
		Any combination totalling 6 front and 6 back non-independent contacts or 12 independent contacts can be supplied, but it is not possible to furnish more than 11 back contacts.	
		For Operating Mechanism Details refer to Plate E-1017.	
		For Circuit Controlling Mechanism Details refer to Plate E-1035.	
		For Case Details refer to Plate E-1037.	

PLATE E-1017

UNION SWITCH & SIGNAL CO.



OPERATING MECHANISM AND DETAILS FOR SV-12 VANE RELAY

Remove Staple and File Pages in Proper Sequence in Loose Leaf Cover

Section
E

Relays, Indicators and Electric Locks

"SV-20" AND "SV-21" VANE TYPE RELAYS

(Revised March, 1931, Supersedes Issue of April, 1926)

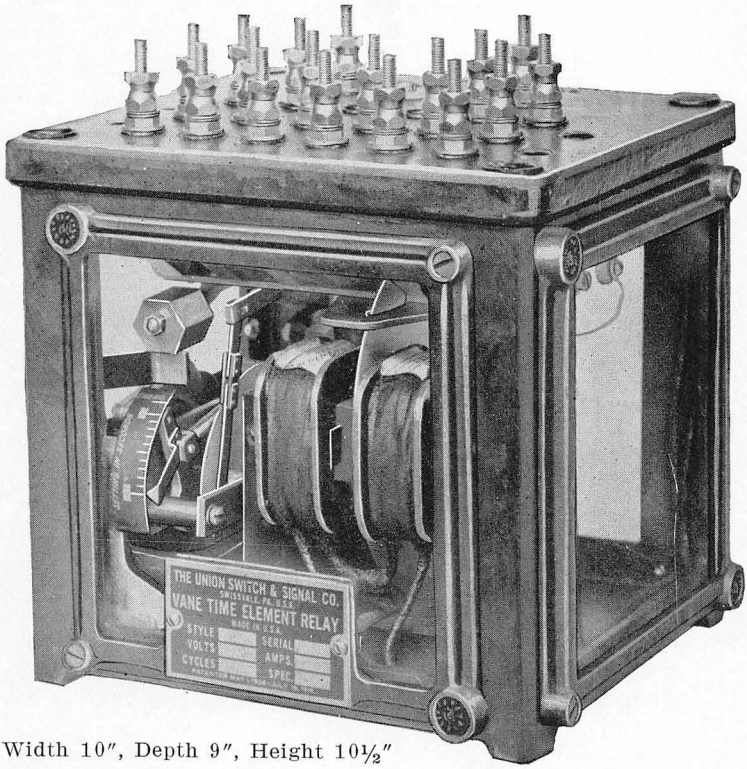
Union Switch & Signal Co.
Swissvale, Pa.

4-31

Printed in U.S.A.

PLATE E-1050

UNION SWITCH & SIGNAL CO.



Width 10″, Depth 9″, Height 10½″

STYLE SV-20 AND SV-21 TIME ELEMENT VANE RELAY

The SV-20 Vane Relay can be wound for any standard voltage and frequency for line operation. It requires no external resistor or other phase splitting devices. The principal application of this relay is for special conditions of railway signaling where it is essential to introduce time intervals after which signal functions should be operable.

The SV-21 is the same as the SV-20 except that an adjustment is provided so that the time range may be halved.

Contact Capacity: Twelve independent contacts, ten of which many be front contacts, is the maximum equipment; except when the checking contact is used, the maximum number of regular contacts that can be supplied is eleven independent contacts because two terminal posts on the top plate must be used to terminate the checking contact.

Operation: When energy at any voltage above the minimum operating voltage (85% of normal) of the relay is applied to the relay coils, the vane at once rotates until the countershaft segment is driven against the stop, thereby extending the spring on the link connected to the time element device. The tension of the spring serves to drive the retarding vane at a uniform rate, thus providing a time element that is independent of the applied voltage. No movement of the contacts occurs until nearing the completion of the time element, when the arm driving the gear train lifts the contact arm to open the back and close the front contacts. When the relay is de-energized, the gear segment falls by gravity due to the counterweight, carrying with it contacts and all connected

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21

FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035
FOR DETAILS OF RELAY SEE PLATE E-1055

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style SV-20 Vane Time Element Line Relay,** complete	C–8298
	B	**Style SV-21 Vane Time Element Line Relay,** complete, with magnetic shunt.....	C–8298–2
		Orders must specify Voltage and Frequency of alternating current available and number of Front and Back Contacts required, also time interval in seconds desired, unless otherwise specified Front and Back Contacts will be non-independent.	

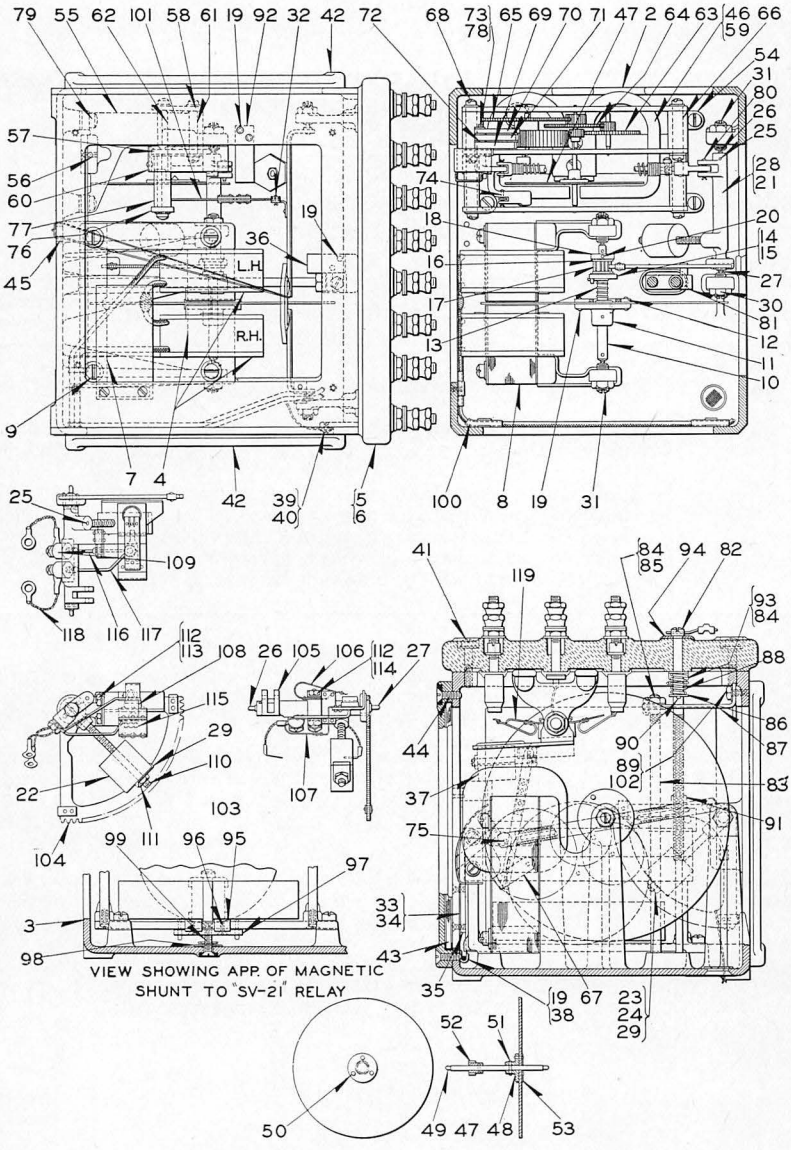
parts. Pawls acting on a ratchet wheel allow the relay to release without rotating the train of gears. The relay will therefore open its front and close its back contacts immediately after being de-energized.

When specified on the order the SV-20 and SV-21 relays will be equipped with a special contact actuated by the retarding mechanism, which can be used to check that the retarding mechanism has returned to the fully de-energized position thus insuring that the time element for the next operation of the relay will be that for which the relay has been adjusted.

Adjustment: The time element of the SV-20 relay may be adjusted to operate at any interval between the limitations of either 3 to 15 or 5 to 25 seconds, and the time element of the SV-21, which is equipped with a magnetic shunt, is adjustable between 1½ and 15 seconds, without opening the case. This adjustment is obtained by varying the stroke of the gear segment by means of an adjustable back stop, the position of which is determined by a filister head screw extending through the top plate. Provision is made to seal this screw when the desired adjustment has been made.

PLATE E-1055

UNION SWITCH & SIGNAL CO.



STYLE SV-20 AND SV-21 VANE TIME ELEMENT RELAYS (DETAIL PARTS)

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
117962	**2**	**Case** complete, for SV-20 Time Element Relay.....	C–8299–1
121157	**3**	**Case** complete, for SV-21 Time Element Relay.....	C–8299–1
	4	**Coils and Core** complete (Orders should specify voltage and frequency).	

Top Plate, complete with Brackets, Terminal Posts and Contact Springs

Piece	Ref.	Contacts		Remarks	Drawing Reference
		Front	Back		
165616	**5**	2F. L.V. Ind.	2B. L.V. Ind.	Silver Springs—Graphite Posts	C–8300–2
166468	**5a**	4F. L.V. Non. Ind.	2B. L.V. Non. Ind.	Graphite Springs—Silver Posts, Arranged for one checking Contact	C–8300–2
126194	**5b**	4F. L.V. Non. Ind.	2B. L.V. Non. Ind.	Graphite Springs—Silver Posts	C–8300–2
121617	**5c**	4F. L.V. Non. Ind.	2B. L.V. Non. Ind.	Silver Springs—Graphite Posts	C–8300–2
140502	**5d**	4F. L.V. Ind.	2B. L.V. Ind.	Silver Springs—Graphite Posts	C–8300–2
142854	**5e**	4F. L.V. Non. Ind.	4B. L.V. Non. Ind.	Silver Springs—Graphite Posts	C–8300–2
157460	**5f**	4F. L.V. Non. Ind.	4B. L.V. Non. Ind.	Graphite Springs—Silver Posts	C–8300–2
125232	**5g**	4F. L.V. Ind.	4B. L.V. Ind.	Silver Springs—Graphite Posts	C–8300–2

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Contacts		Remarks	Drawing Reference
		Front	Back		
134083	**5h**	5F. L.V. Non. Ind.	3B. L.V. Non. Ind.	Silver Springs—Graphite Posts	C–8300–2
171290	**5j**	5F. L.V. Non. Ind.	3B. L.V. Non. Ind.	Silver Springs—Graphite Posts Arranged for one checking Contact	C–8300–2
163485	**5k**	6F. L.V. Ind.	2B. L.V. Ind.	Silver Springs—Graphite Posts Arranged for one checking Contact	C–8300–2
173282	**5m**	6F. L.V. Non. Ind.	4B. L.V. Non. Ind.	Silver Springs—Graphite Posts Arranged for one checking Contact	C–8300–2
117961	**5n**	6F. L.V. Non. Ind.	4B. L.V. Non. Ind.	Silver Springs—Graphite Posts	C–8300–2
121094	**5p**	6F. L.V. Non. Ind.	4B. L.V. Non. Ind.	Graphite Springs—Silver Posts	C–8300–2
155282	**5q**	2F. L.V. Non. Ind. 4F. H.V. Non. Ind.	2B. L.V. Non. Ind. 4B. H.V. Non. Ind.	Silver Springs—Silver Posts Graphite Springs—Graphite Posts	C–8300–2
174054	**5r**	6F. L.V. Non. Ind.	6B. L.V. Non. Ind.	Silver Springs—Silver Posts	C–8300–2

Piece	Ref.	Description	Drawing Reference
76151	**6**	**Top Plate** complete with Brackets only, for Relays having a maximum of 6 Front and 6 Back non-independent contacts (For details see Plate E-1035)	C–8814–10

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
76150	**6a**	**Top Plate** complete with Brackets only, for Relays having a maximum of 12 Front or Back independent contacts (For details see Plate E-1035)	C–8814–10
116256	**7**	**Lamination**	8358–371
116286	**8**	**Lamination**	8358–372
116258	**9**	**Screw** with Washer Ref. 9a	8098–909
	9a	**Washer** $\frac{1}{4}$″x$\frac{9}{16}$″ S. (Cad. Pl.) for Ref. 9.	
117879	**10**	**Vane** complete (Inc. 1-10a, 1-11, 1-12, 1-13, 1-14, 2-15, 1-16, 9-17, 1-18, 3-19 and 1-20)	10985–35
118774	**10a**	**Vane only**, for Ref. 10	10985–33
117872	**11**	**Vane Hub**	C–8299–3
116226	**12**	**Washer**	7828–342
130282	**13**	**Spring**	7770–355
116200	**14**	**Collar**	8350–576
35162	**15**	**Washer**, used on top of Refs. 14 and 18	8078–549
31607	**16**	**Pinion**	8424–111
116355	**17**	**Pin**	8097–264
35156	**18**	**Washer**	8112–59
54921	**19**	**Rivet**	10301–1
59429	**20**	**Rivet**	10301–21
117960	**21**	**Segment** complete (Inc. 1-21a, 1-22, 1-23, 1-24, 1-25, 1-26, 1-27, 1-28 and 1-29)	C–8299–3

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
120136	**21a**	**Segment only,** for Ref. 21	8425–192
117901	**22**	**Counterweight** for Refs. 21 and 103	9672–178
26942	**23**	**Counterweight Nut**	8109–184
116182	**24**	**Counterweight Screw**	8098–540
54928	**25**	**Rivet**	10301–21
116183	**26**	**Pivot**	8378–265
116184	**27**	**Pivot**	8378–265
117957	**28**	**Segment Crank** only	C–8299–1
50111	**29**	**Nut Lock** for Ref. 23	8486–197
124889	**30**	**Trunnion** with Nut Ref. 31a	12471–5
124890	**31**	**Trunnion** with Nut Ref. 31a	12471–5
29577	**31a**	**Nut** for Refs. 30 and 31	8109–205
62223	**32**	**Pin**	8097–837
123173	**33**	**Name Plate**	8225–241
	34	**Machine Screw No. 6-40x½″** Flat Hd. S. For Refs. 33 and 35.	
112932	**35**	**Block**	11893–200
116304	**36**	**Stop Plate**	11893–141
69827	**37**	**Counterweight for Contact Spring**	9672–162
116272	**38**	**Clip**	8735–580
20686	**39**	**Washer**	7828–108

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	40	**Machine Screw No. 6-40x1/4″** Rd. Hd. Br. (N. P.).	
	41	**Machine Screw No. 14-24x1″** Fil. Hd. S. (Cad. Pl.) with Washer Ref. 41a.	
38448	**41a**	**Washer** for Ref. 41	7826–98
65954	**42**	**Door**	C–8814–6
94596	**43**	**Glass Shield (Side and End)**	8163–282
	44	**Machine Screw No. 10-30x5/8″** Flat Hd. S. (Cad. Pl.) for Ref. 42.	
	45	**Machine Screw No. 4-48x1/4″** Rd. Hd. S. (To plug up holes after twine is removed).	

Retarding Mechanism Complete

Piece	Ref.	Vane Ref.	Magnet Ref.	Dial Ref.	Time Interval	Remarks	Drawing Reference
117958	**46**	47a	59	60	15 Sec. Max.		C–8299–2
118493	**46a**	47a	59	60	25 Sec. Max.	With checking contacts	C–8299–2
121152	**46b**	47a	59a	60a	15 Sec. Max.	With Magnetic Shunt	C–8299–2
124490	**46c**	47	59	60	45 Sec. Max.		C–8299–2
150032	**46d**	47a	59a	60	7½ Sec. Max.	With Magnetic Shunt and checking contact	C–8299–2
160370	**46e**	47	59a	60	45 Sec. Max.	With Magnetic Shunt	C–8299–2
166455	**46f**	47a	59a	60	25 Sec. Max.	With checking contacts	C–8299–2

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
138493	**47**	**Vane** complete (Inc. 1-47b, 1-48, 1-49, 4-50, 1-51, 1-52 and 1-53)	10985–42
138494	**47a**	**Vane** complete (Inc. 1-47b, 1-48, 1-49, 4-50, 1-51, 1-52a and 1-53)	10985–42
64229	**47b**	**Vane only,** for Refs. 47 and 47a	10985–21
64230	**48**	**Collar**	8350–580
64232	**49**	**Shaft**	8160–130
37527	**50**	**Rivet**	10301–41
46018	**51**	**Rivet**	10301–41
64231	**52**	**Pinion** for Ref. 47	8424–181
66653	**52a**	**Pinion** for Ref. 47a	8424–184
66616	**53**	**Washer**	7828–316
117902	**54**	**Bracket**	C–8299–1
123133	**55**	**Bracket**	C–8299–1
	56	**Machine Screw No. 10-30x½″** Flat Hd. Br.	
117866	**57**	**R. H. Side Plate** for Refs. 46 and 46b	C–8299–2
66631	**57a**	**R. H. Side Plate** for Refs. 46a and 46f	C–8168–10
64266	**57b**	**R. H. Side Plate** for Refs. 46c and 46e	C–8168–9
150031	**57c**	**R. H. Side Plate** for Ref. 46d	C–8299–3
117865	**58**	**L. H. Side Plate** for Refs. 46 and 46b	C–8299–2
79732	**58a**	**L. H. Side Plate** for Refs. 46a and 46f	C–8168–10

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
79582	**58b**	**L. H. Side Plate** for Refs. 46c and 46e	C–8168–9
150030	**58c**	**L. H. Side Plate** for Ref. 46d	C–8299–3
83036	**59**	**Magnet** complete	C–8168–11
121153	**59a**	**Magnet** complete (arranged for Magnetic Shunt)	C–8299–2
120127	**60**	**Dial** with 10 Equal Spaces (Setting in seconds)	11893–164
121088	**60a**	**Dial** with 12 Equal Spaces (Setting in seconds)	11893–164
64248	**61**	**Bushing**	8350–582
64249	**62**	**Bushing**	8350–582
138487	**63**	**Gear** for Refs. 46, 46a, 46b, 46c, 46e and 46f	8424–215
150028	**63a**	**Gear** for Ref. 46d	8424–215
138489	**64**	**Gear** for Refs. 46, 46b and 46d	8424–210
138510	**64a**	**Gear** for Refs. 46a, 46c, 46e and 46f	8424–176
138492	**65**	**Gear**	8424–214
64273	**66**	**Bushing**	8350–513
138499	**67**	**Crank**	8233–127
	68	**Machine Screw No. 10-30x3/8″** Fil. Hd. Br. (N. P.) with Washer Ref. 68a.	
44618	**68a**	**Washer** for Ref. 68	7828–184
144752	**69**	**Ratchet Pawl**	9121–82
144750	**70**	**Ratchet Pawl**	9121–82

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
144751	**71**	**Ratchet Pawl**	9121–82
92954	**72**	**Washer**	7828–287
85711	**73**	**Pin**	8097–872
61151	**74**	**Pin**	8097–837
64272	**75**	**Pin**	8097–958
79588	**76**	**Plate**	C–8168–9
120133	**77**	**Bushing**	8350–513
144749	**78**	**Washer** for Ref. 73	7828–346
	79	**Machine Screw No. 14-24x⅝″** Fil. Hd. S.	
60532	**80**	**Pin**	8097–837
117910	**81**	**Stop** with Stud	C–8299–3
117943	**82**	**Adjusting Screw**	8098–1284
117947	**83**	**Supporting Screw**	8098–639
29103	**84**	**Nut**	8109–194
52010	**85**	**Nut Lock**	8486–267
29102	**86**	**Washer**	7828–139
117939	**87**	**Stop Plate**	11893–163
118152	**88**	**Spring**	7770–319
19409	**89**	**Nut Lock**	8486–68
	90	Cotter, $\frac{1}{16}$″x½″ S.	
173158	**91**	**Separator**	8350–790

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
118051	**92**	**Stop Bracket**	11893–167
118172	**93**	**Screw**	8098–631
36088	**94**	**Washer**	7826–136
121159	**95**	**Block**	8250–68
	96	**Machine Screw No. 6-40x1/4″** Flat Hd. Br. (N. P.).	
121160	**97**	**Support**	12538–1
121161	**98**	**Washer**	7828–344
121162	**99**	**Adjusting Screw** with 1/16″x3/8″ Br. Cotter	8098–1287
	100	**Flexible Black Tubing, 1/2″x1/16″x1″.**	
118005	**101**	**Link**	8232–178
118356	**102**	**Screw**	8098–850
163200	**103**	**Segment and Checking Contact Assembly** complete (Used only on relay with Checking Contact)	C–8299–4
120136	**104**	**Segment**	8425–192
163249	**105**	**Segment Crank**	C–8299–4
163008	**106**	**Contact Spring**	8385-2229
163083	**107**	**Contact Spring**	8385–2233
62135	**108**	**Contact Spring Board**	9968–397
22621	**109**	**Insulating Bushing**	8095–199
116182	**110**	**Screw**	8098–540

UNION SWITCH & SIGNAL CO.

VANE TIME ELEMENT RELAYS
SV-20 and SV-21
(Continued)

DETAIL PARTS

FOR COMPLETE RELAYS SEE PLATE E-1050
FOR DETAILS OF TOP PLATE AND CONTACT SPRINGS SEE PLATE E-1035

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
26942	**111**	**Nut** for Ref. 37	8109–184
1515	**112**	**Nut**	8109–23
74798	**113**	**Lock Washer**	8486–155
19409	**114**	**Lock Washer**	8486–68
157891	**115**	**Lock Washer**	8486–368
163260	**116**	**Connector**	8064–690
163261	**117**	**Connector**	8064–690
163549	**118**	**Flexible Connector**	10934–73
	119	**Contact Spring** (For details refer to Plate E-1035)	8385–
		For other details of Top Plate and Contact Springs, see Plate E-1035.	

UNION SWITCH & SIGNAL CO.

STYLE TV-30 TWO-ELEMENT TWO-POSITION VANE TRACK RELAY DETAIL PARTS (Continued)

For Ordering References of Complete Relay Refer to Plate E-1071

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

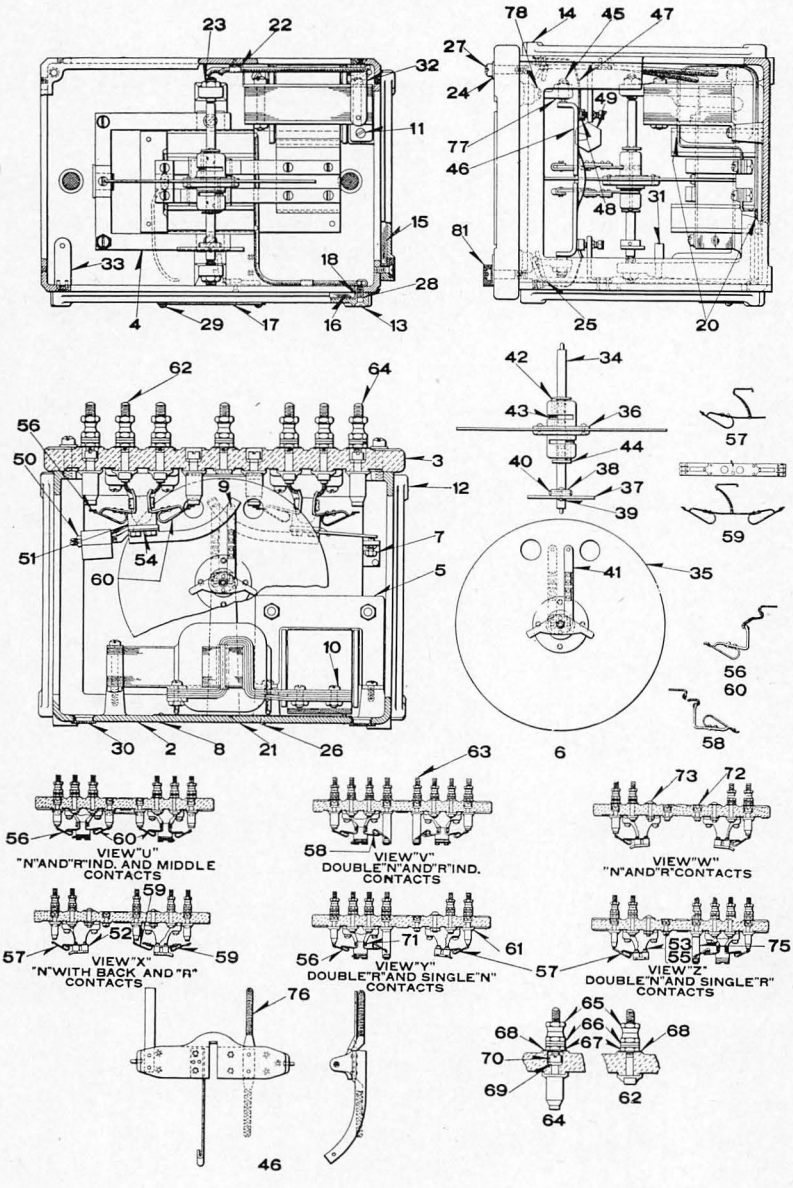
Piece	Ref.	Description	Drawing Reference
112738	**69**	**Contact Spring** complete	8385–1882
110664	**70**	**Contact Spring** complete	8385–1882
72667	**71**	**Terminal Bracket, complete** with Graphite Contact for Contact Spring 70	8094–1190
	72	**Terminal Post, complete** with Nuts, Washers and Lock Washers for 71	12451
1399	**72a**	**Terminal Post,** only for 72	8094–706
74798	**73**	**Lock Washer** for 48	8486–155
	74	**Machine Screw No. 6-40x¼″** Rd. Hd. Br. (Nickel Plated) with one washer 25a for attaching 49 to 47 and 47a.	
132645	**75**	**Contact Bar Bracket** for Top Plate	C–8814–24
	76	**Machine Screw No. 14-24x1⅜″** Fil. Hd. Br. (Nickel Plated) for 75.	
132644	**77**	**Strap** for Top Plate (Not Shown)	11893–263
130178	**78**	**Insulation** for Top Plate (Used under 75) not shown	8750–2152
36073	**79**	**Washer** (Used under 77) not shown	7828–101
88945	**80**	**Contact Spring** complete	8385–1659
	81	**Dummy Post complete No. 14-24x¾″** Fil. Hd. S. (Cad. Pl.) with one washer 63. One washer 59 and Nut 62	12471
	82	**Dummy Post complete** with nut 60 washer 61 and washer 59	12471

Remove last sheet of Plate E-1073, dated 4-26, which is now in your loose leaf catalog, before inserting these new sheets.

Printed in U.S.A.

PLATE E-1075

UNION SWITCH & SIGNAL CO.



STYLE TV-30 THREE-POSITION VANE RELAY DETAILS

UNION SWITCH & SIGNAL CO.

STYLE TV-30 TWO-ELEMENT THREE-POSITION VANE TRACK RELAY DETAILS

For Ordering References of Complete Relay Refer to Plate E-1071

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
117977	**2**	**Case** complete with Ventilators and Straps	C–8296–2
117976	**2a**	**Case only**	C–8296–2
	3	**Top Plate and Contact Combination complete** (Orders must specify Contact Combination Desired)	C–8297–2
177854	**3a**	**Top Plate complete with Contact Bar Brackets, Straps and Insulation**	C–8297–1
131408	**3b**	**Top Plate** only for 3 and 3a	C–8296–4
	4	**Field complete,** (Orders must specify Voltage and Frequency, also Piece Number of the Relay with which Field is to be used)	C–8296–3
	5	**Transformer complete,** (Orders must specify Voltage and Frequency, also Piece Number of the Relay with which Transformer is to be used)	C–8605–11
117955	**6**	**Vane,** complete	10985–37
29354	**7**	**Screw** complete with Lock Nut 7a	8098–500
32498	**7a**	**Lock Nut** for 7	8109–223
54921	**8**	**Rivet** for 6, 21 and 33	10301–1
62223	**9**	**Pin**	8097–897
	10	**Machine Screw No. 10-30x½″** Fil. Hd. Br. with Hex. Nut 10a.	
26545	**10a**	**Hex. Nut** for 10	8109–181
	11	**Machine Screw No. 10-30x½″** Fil. Hd. S. (Cad. Pl.).	
91076	**12**	**Door**	C–8107–7
118314	**13**	**Door**	C–8107–7
91075	**14**	**Door**	C–8107–7

UNION SWITCH & SIGNAL CO.

STYLE TV-30 TWO-ELEMENT THREE-POSITION VANE TRACK RELAY DETAILS
(Continued)

For Ordering References of Complete Relay Refer to Plate E-1071

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
86392	**15**	**Glass Shield**	8163–255
86391	**16**	**Glass Shield**	8163–255
118315	**17**	**Name Plate**	8225–228
90947	**18**	**Gasket**	8078–1268
70823	**19**	**Gasket**	8078–1268
118264	**20**	**Insulation**	8750–914
118017	**21**	**Insulation**	8750–2089
116272	**22**	**Wire Clip**	8735–580
126857	**23**	**Trunnion,** complete with Hex. Lock Nut	12471–5
131440	**24**	**Washer**	7828–6
	25	**Machine Screw, No. 6-40x1/4″** Rd. Hd. Br. (Nickel Plate) with two washers Ref. 25a.	
20686	**25a**	**Washer** only for 25	7828–108
	26	**Machine Screw No. 6-40x1 1/4″** Rd. Hd. S. (Cad. Pl.)	
	27	**Machine Screw No. 14-24x1 1/8″** Fil. Hd. Br. (Nickel Plate).	
	28	**Machine Screw No. 10-30x5/8″** Fil. Hd. S. (Cad. Pl.)	
	29	**Machine Screw No. 6-40x$\frac{3}{16}$″** Rd. Hd. Br. (Nickel Plate)	
34340	**30**	**Ventilator**	C–7459–6
117945	**31**	**Pin**	8114–539
117622	**32**	**Stop Bracket**	11893–159

UNION SWITCH & SIGNAL CO.

STYLE TV-30 TWO-ELEMENT THREE-POSITION VANE TRACK RELAY DETAILS

(Continued)

For Ordering References of Complete Relay Refer to Plate E-1071

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
117623	**33**	**Stop Bracket**	11893–159
117977	**34**	**Shaft,** complete for 6	C–8296–2
117955	**35**	**Vane** for 6	10985–36
117966	**36**	**Washer** for 6	7828–343
117949	**37**	**Stop** for 6	11893–166
117948	**38**	**Collar** for 6	8350–529
54928	**39**	**Rivet** for 38	10301–1
117299	**40**	**Pin** for 38	8097–999
117383	**41**	**Link**	8232–177
117925	**42**	**Pin**	8097–837
117786	**43**	**Washer**	7828–184
	44	**Washer** $\frac{3}{16}$″ Std. Plate (Cad. Pl.).	
96403	**45**	**Trunnion, complete with Lock Nut**	12471–5
133076	**46**	**Contact Spring Support,** (L. H. as shown in dot and dash lines)	C–8296–1
	46a	**Contact Spring Support** (R. H. as shown in full lines)	C–8296–1
	47	**Flexible Connector**	10934–107
	48	**Machine Screw No. 6-40x¼″** Fil. Hd. Br. (Nickel Plated) with Washer 25a	
69827	**49**	**Counterweight**	9672–162
26942	**50**	**Hex. Nut**	8109–184
62135	**51**	**Contact Spring Board** for Independent Contacts	9968–397

PLATE E-1075

UNION SWITCH & SIGNAL CO.

STYLE TV-30 TWO-ELEMENT THREE-POSITION VANE TRACK RELAY DETAILS

(Continued)

For Ordering References of Complete Relay Refer to Plate E-1071

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
22621	**52**	**Ins. Bushing**	8095–199
1515	**53**	**Nut** for 51 and 52	8109–23
74798	**54**	**Lock Washer** for 51	8486–155
19409	**55**	**Lock Washer** for 52	8486–68
110663	**56**	**L. H. Contact Spring complete** (Ind. Front)	8385–1882
88945	**57**	**Contact Spring complete** (Non-Ind. Front only)	8385–1659
110664	**58**	**R. H. Contact Spring complete** (Ind. Front)	8385–1882
88944	**59**	**Contact Spring complete** (Non-Ind. Front and Back)	8385–1659
112738	**60**	**Contact Spring complete** (Ind. Back)	8385–1882
29063	**61**	**Lock Washer**	8486–111
	62	**Terminal Post complete** with Nuts, Washers and Lock Nuts.	
130200	**62a**	**Terminal Post** only for 62	8094–1192
	63	**Terminal Post complete** with Nuts, Washers and Lock Washers	12451
130199	**63a**	**Terminal Post** only for 63	8094–1190
	64	**Terminal Post with Nuts, Washers and Lock Washers** (Includes 1-62a, 1-61, 1-69, 1-68, 1-70, 1-67, 1-64a, 2-66 and 2-65)	12451
112419	**64a**	**Contact Holder** complete with Graphite Contact for 64	8094–1192
29101	**65**	**Nut**	8109–194
29102	**66**	**Washer**	7828–287
29103	**67**	**Nut**	8109–194

UNION SWITCH & SIGNAL CO.

STYLE TV-30 TWO-ELEMENT THREE-POSITION VANE TRACK RELAY DETAILS

(Continued)

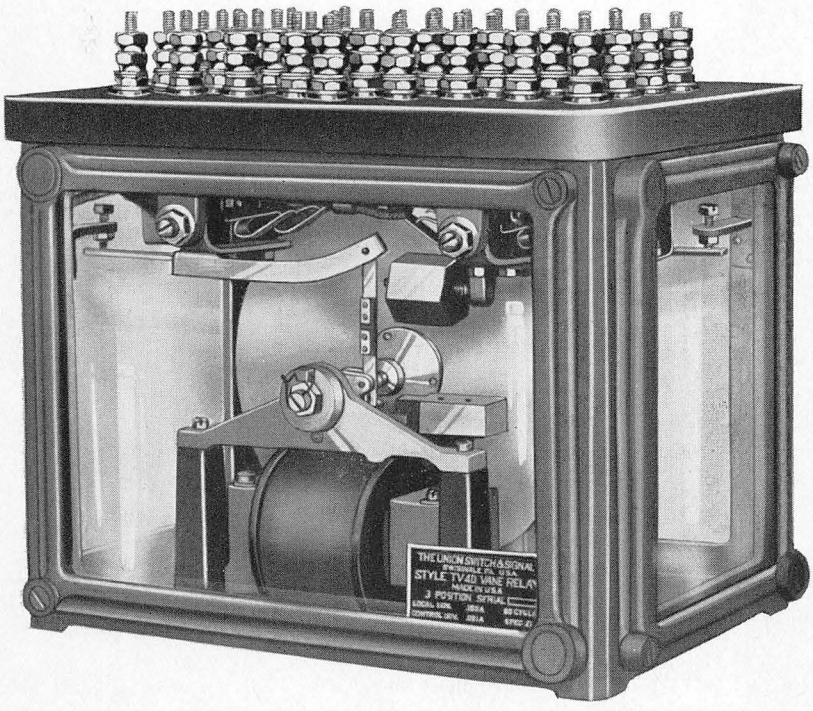
For Ordering References of Complete Relay Refer to Plate E-1071

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
69705	**68**	**Washer**	7828–287
70539	**69**	**Washer**	8274–73
72948	**70**	**Nut**	8109–383
49144	**71**	**Washer**	7828–213
	72	**Dummy Post,** complete No. 14¾″ Fil. Hd. S. (Cad. Pl.) with 1 Washer 66, 1 Washer 69 and Nut 70	12471
	73	**Dummy Post,** complete with Nut 67, Washer 68, and Washer 66	12471
121616	**74**	**Lock Washer**	8486–362
72667	**75**	**Terminal Bracket,** complete with Graphite Contact for Contact Spring 58.	
48144	**76**	**Counterweight Support** for 6	C–8101–2
132645	**77**	**Contact Bar Bracket,** for Top Plate	C–8814–24
	78	**Machine Screw** No. 14-24x1⅜″ Fil. Hd. Br. (Nickel Plated).	
132644	**79**	**Strap for Top Plate** not shown	11893–263
130178	**80**	**Insulation for Top Plate** (Used under 79 not shown)	8750–2152
131435	**81**	**Sealing Cup**	11893–257
36073	**82**	**Washer** (Used under 79 not shown)	7828–161

PLATE E-1080

UNION SWITCH & SIGNAL CO.



STYLE "TV-40" VANE TYPE RELAY

The Style "TV-40" Relay is very economical in power consumption and is designed especially for application as a "KR" Relay. It can be wound for any standard frequency from 25 to 100 Cycles. The local element can be wound for usual signaling voltages and the control element is ordinarily wound for operation from the 110 volt secondary of an indication transformer having a high resistance winding.

The maximum contact equipment of the Style "TV-40" relay is 7 normal, 7 reverse and 1 de-energized contacts.

UNION SWITCH & SIGNAL CO.

STYLE "TV-40" VANE TYPE RELAY
THREE-POSITION TWO-ELEMENT

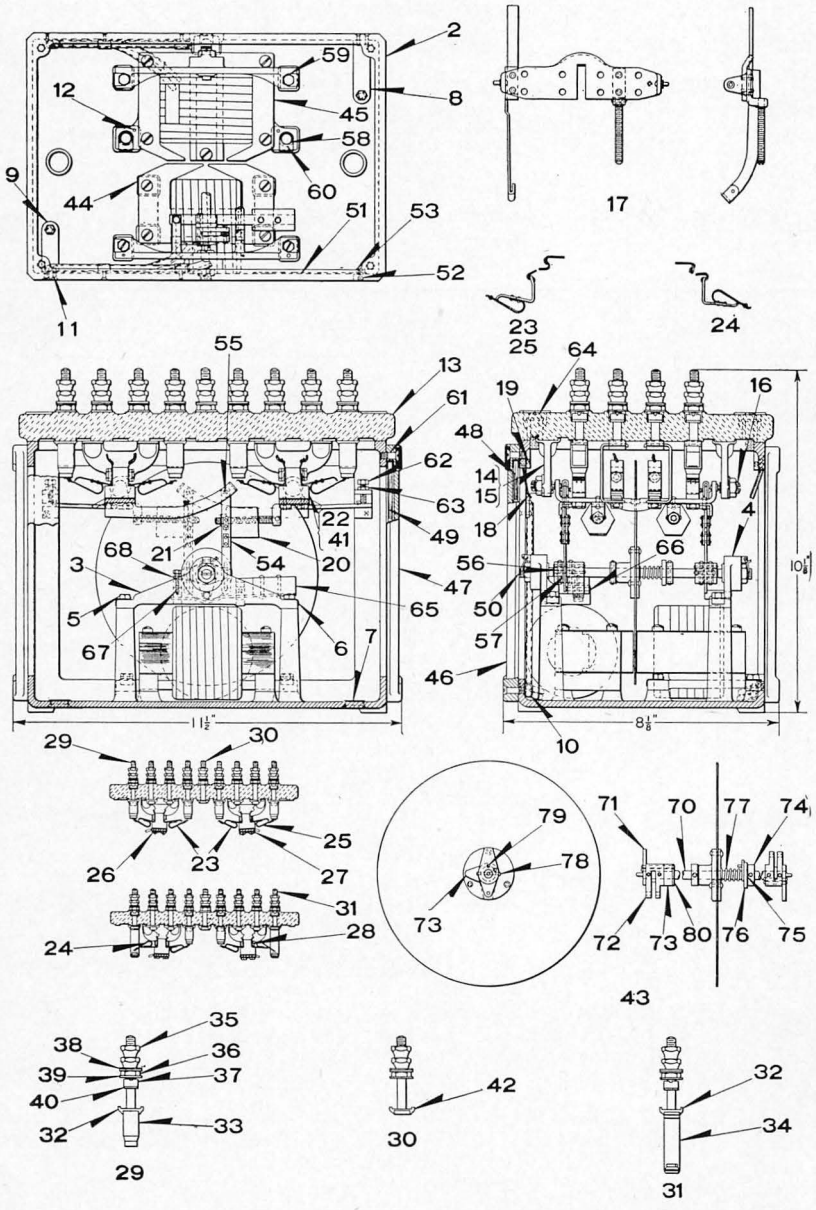
For Details Refer to Plate E-1081

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
161111	**A**	**Style "TV-40" 2-Element, 3-Position, A.C. Vane Type Indication Relay,** complete with 6 Normal, 6 Reverse, 2 N. B. and 2 R. B. Independent Contacts Spec. 2110, Local 75 /110 Volts, 60 /100 Cycles (For diagrams of Contacts see Plate E-1081).....	C–9285–2
162966	**Aa**	**Style "TV-40" 2-Element, 3-Position, A.C. Vane Type Indication Relay,** complete with 6 Normal, 6 Reverse, 2 N. B. and 2 R. B. Independent Contacts, Spec. 2122, Local 110 Volts, 60 Cycles (For diagrams of Contacts see Plate E-1081).....	C–9285 2

PLATE E-1081

UNION SWITCH & SIGNAL CO.



STYLE "TV-40" TWO-ELEMENT, THREE-POSITION
VANE TYPE RELAY

UNION SWITCH & SIGNAL CO.

STYLE "TV-40" TWO-ELEMENT, THREE-POSITION VANE TYPE RELAY

DETAIL PARTS

For Complete Relay Refer to Plate E-1080

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
160792	**2**	**Case**, complete with Ventilators, Pivot Brackets, Stop Brackets, Clips, Rivets and Pins (Includes 1-2a, 1-3, 1-4, 4-5, 4-6, 2-7, 1-8, 1-9, 6-10, 10-11 and 4-12)	C–9286–1
152326	**2a**	**Case only**, for Ref. 2	C–9286–1
160790	**3**	**Pivot Bracket** with Vane Stop	C–9286–2
160791	**4**	**Pivot Bracket** with Vane Stop	C–9286–2
115567	**5**	**Machine Screw**	8098–850
115568	**6**	**Lock Washer** for Ref. 5	8486–197
34340	**7**	**Ventilator** for Ref. 2	C–7459–6
117622	**8**	**Stop Bracket** for Ref. 2	11893–159
117623	**9**	**Stop Bracket** for Ref. 2	11893–159
116272	**10**	**Wire Clip** for Ref. 2	8735–580
54921	**11**	**Rivet** for attaching Stop Brackets and Wire Clips to Case	10301–1
37524	**12**	**Pin**, for attaching Pivot Brackets to Case	8097–279
161045	**13**	**Top Plate and Contact Spring Combination**, complete with 6 Normal, 6 Reverse, 2 N. B. and 2 R. B. Independent Contacts for 2-Element, 3-Position Style "TV-40" Vane Type Relay	C–9291–2
161044	**13a**	**Top Plate with Contact Bar Brackets, Screws and Washers** for Ref. 13	C–9291–1
152705	**13b**	**Top Plate only** for Ref. 13a	C–8296–7
69724	**14**	**Contact Bar Bracket** for Ref. 13a	C–8814–9

UNION SWITCH & SIGNAL CO.

STYLE "TV-40" TWO-ELEMENT, THREE-POSITION VANE TYPE RELAY

DETAIL PARTS
(Continued)

For Complete Relay Refer to Plate E-1080

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	15	**Machine Screw No. 14-24x7/8″** Fil. Hd. S. (Cad. Pl.) with Washer Ref. 15a for attaching Ref. 14 to Top Plate.	
69701	**15a**	**Washer only,** for Ref. 15	7826–241
96403	**16**	**Trunnion** with Lock Nut Ref. 16a	12471–5
29577	**16a**	**Hex. Nut** for Ref. 16 and 50	8109–205
160930	**17**	**Contact Spring Support,** complete	C–9286–2
73587	**18**	**Flexible Connector**	10934–107
	19	**Machine Screw No. 6-40x1/4″** Rd. Hd. Br. (N. P.) with Washer Ref. 19a.	
20686	**19a**	**Washer** for Ref. 19	7828–108
136674	**20**	**Counterweight**	9672–189
26942	**21**	**Hex. Nut**	8109–184
62135	**22**	**Contact Spring Block** for Independent Contacts	9968–397
110663	**23**	**Contact Spring** (L. H. Front)	8385–1882
110664	**24**	**Contact Spring**	8385–1882
112738	**25**	**Contact Spring** (L. H. Back)	8385–1882
1515	**26**	**Hex. Nut**	8109–23
74798	**27**	**Lock Washer**	8486–155
19409	**28**	**Lock Washer**	8486–68
	29	**Terminal Post Complete** (Includes 1-30a, 1-32, 1-33, 2-35, 1-36, 1-37, 2-38, 1-39 and 1-40)	12451

UNION SWITCH & SIGNAL CO.

STYLE "TV-40" TWO-ELEMENT, THREE-POSITION VANE TYPE RELAY

DETAIL PARTS
(Continued)

For Complete Relay Refer to Plate E-1080

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	30	**Terminal Post Complete** (Includes 1-30a, 1-32, 2-35, 1-36, 2-38 and 1-39)	12451
112417	**30a**	**Terminal Post only** for Refs. 29 and 30	8094–1192
	31	**Terminal Post Complete** (Includes 1-31a, 1-32, 1-34, 2-35, 1-36, 1-37, 2-38, 1-39 and 1-40)	12451
70627	**31a**	**Terminal Post only** for Ref. 31	8094–797
29063	**32**	**Lock Washer**	8486–111
112419	**33**	**Terminal Post** with Graphite Contact	8094–1193
72667	**34**	**Terminal Post** with Graphite Contact	8094–1190
29101	**35**	**Hex. Nut**	8109–193
29103	**36**	**Hex. Nut**	8109–194
72948	**37**	**Nut**	8109–383
29102	**38**	**Washer**	7828–139
69705	**39**	**Washer**	7828–287
70539	**40**	**Washer**	8274–73
49144	**41**	**Washer**	7828–213
121616	**42**	**Lock Washer**	8486–362
162339	**43**	**Vane**, complete with Shaft, Cranks, Stops, Spring and Collars	10985–46
161140	***44**	**Control Field, 75/100 Volts, 60/100 Cycles, Spec. 2110 and 2122**	C–9286–3
161140	***44a**	**Control Field, 110 Volts, 60 Cycles, Spec. 2110 and 2122**	C–9286–3

UNION SWITCH & SIGNAL CO.

STYLE "TV-40" TWO-ELEMENT, THREE-POSITION VANE TYPE RELAY

DETAIL PARTS
(Continued)

For Complete Relay Refer to Plate E-1080

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
161138	*44b	**Coil only** for Refs. 44, 44a and 45	10991–216
161141	*45	**Local Field, 75/110 Volts, 60/100 Cycles, Spec. 2110**	C–9286–3
162965	*45a	**Local Field, 110 Volts, 60 Cycles, Spec. 2122**	C–9286–3
162964	*45b	**Coil only** for Ref. 45a	10991–216
		*NOTE: If other Voltages and Frequency are desired orders should so state.	
91075	**46**	**Door**	C–8101–7
91076	**47**	**Door**	C–8101–7
142197	**48**	**Glass Shield** with Gasket	8163–282
90947	**48a**	**Gasket only,** for Ref. 48	8078–1268
142198	**49**	**Glass Shield** with Gasket	8163–282
70823	**49a**	**Gasket only,** for Ref. 49	8078–1268
161129	**50**	**Trunnion Screw** with Lock Nut Ref. 16a	12471–5
161043	**51**	**Name Plate** Marked—Local 75/110 V. Spec. 2110	8225–343
162967	**51a**	**Name Plate** Marked—Local 110 V. Spec. 2122	8225–358
	52	**Machine Screw No. 6-40x½″** Flat Hd. S. (Cad. Pl.).	
122932	**53**	**Strap**	11893–200
160902	**54**	**Link**	8232–190
62223	**55**	**Pin** for Links	8097–837
162311	**56**	**Pin**	8097–1038
117786	**57**	**Washer**	7828–184

UNION SWITCH & SIGNAL CO.

STYLE "TV-40" TWO-ELEMENT, THREE-POSITION VANE TYPE RELAY

DETAIL PARTS
(Continued)

For Complete Relay Refer to Plate E-1080

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
140943	**58**	**Screw**	8098–1407
115568	**59**	**Lock Washer** for Ref. 58	8486–197
83	**60**	**Washer** for Ref. 58	7828–3
	61	**Machine Screw No. 10-30x⅝″** Flat Hd. S. (Cad. Pl.).	
29354	**62**	**Screw with Lock Nut** Ref. 63	8098–500
32498	**63**	**Hex. Nut** for Ref. 62	8109–223
	64	**Machine Screw No. 14-24x⅞″** Fil. Hd. S. (Cad. Pl.) with $\frac{3}{16}$″ Std. Plate Washer ($\frac{1}{4}$″x$\frac{9}{16}$″).	
161283	**65**	**Buffer**	9672–199
136629	**66**	**Pin**	8097–1038
162458	**67**	**Screw with Lock** Nut Ref. 68	8098–923
40916	**68**	**Hex. Nut** for Ref. 67	8109–272
122308	**69**	**Terminal** for Coil Leads (Not shown)	8244–113
152800	**70**	**Shaft** for Vane	8160–185
152798	**71**	**Stop** for Vane	11893–485
152801	**72**	**Crank** for Vane	8233–128
152797	**73**	**Cam** for Vane	8750–2369
162343	**74**	**Collar** for Vane	8350–529
152799	**75**	**Washer** for Vane	8078–1392

UNION SWITCH & SIGNAL CO.

STYLE "TV-40" TWO-ELEMENT, THREE-POSITION VANE TYPE RELAY

DETAIL PARTS
(Continued)

For Complete Relay Refer to Plate E-1080

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
162359	**76**	**Collar** for Vane	8350–576
116600	**77**	**Coil Spring** for Vane	7770–355
54929	**78**	**Rivet** for Vane	10301–21
54930	**79**	**Rivet** for Vane	10301–21
29104	**80**	**Washer** for Vane	7828–138

Section
E

SUPPLEMENT 5

Relays, Indicators and Electric Locks

STYLE "ANL-21" POWER TRANSFER RELAY

TRADE

MARK

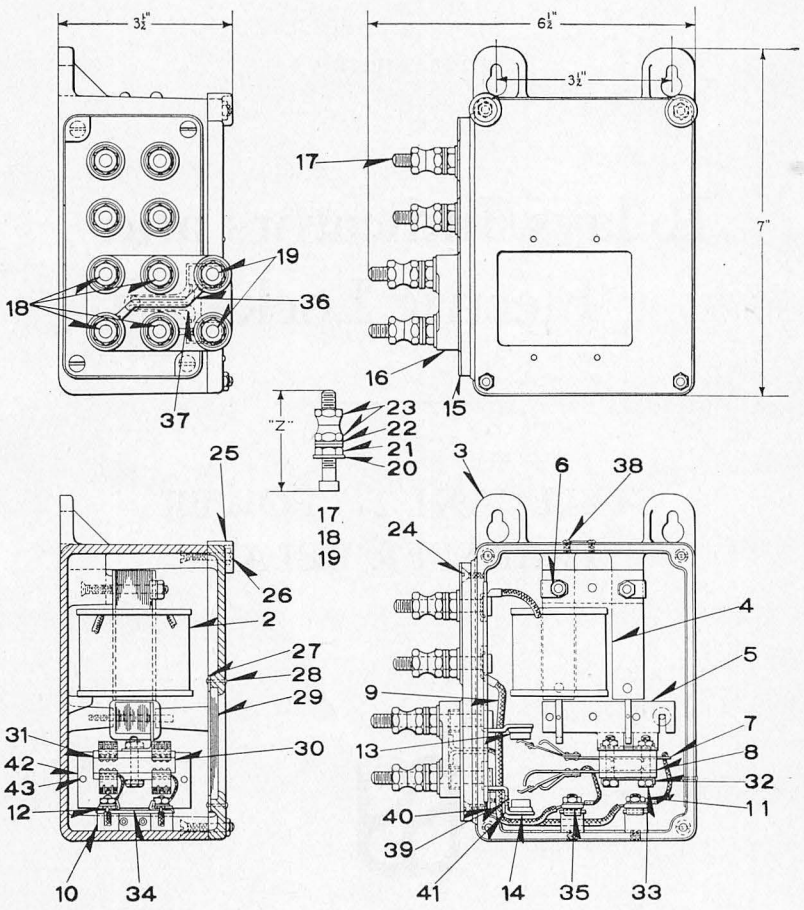
Union Switch & Signal Co.
Swissvale, Pa.

3-27

Printed in U. S. A.

PLATE E-1136

UNION SWITCH & SIGNAL CO.



STYLE ANL-21 POWER TRANSFER RELAY

The ANL-21 relay is wound for any voltage up to 220 volts 100 and 60 cycles or 110 volts 25 cycles. It is recommended for use as a line relay in cases where safety is not determining factor.

The maximum contact combination of the ANL-21 is two front and two back independent contacts.

UNION SWITCH & SIGNAL CO.

STYLE ANL-21 POWER TRANSFER RELAY

Order by Plate, Piece, Reference and Description

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
139475	A	Style ANL-21 Power Transfer Relay, complete with 2 Front and 2 Back Ind. Contacts, 11 Volts, 100 Cycle, Spec. 1604	C–9130–2
139808	Aa	Style ANL-21 Power Transfer Relay, complete with 2 Front and 2 Back Ind. Contacts for 5-Volts, 25 cycles or 10-Volts, 60 cycles, Spec. 1603	C–9130–2
139270	2	Coil Comp. 11 Volts, 100 Cycles	10991–186
139806	2a	Coil Comp., for 5 Volts, 25 Cycles or 10 Volts, 60 Cycles	10991–186
139474	3	Case only	C–9129–1
137951	4	Core, complete	8101–313
139461	5	Armature, complete for A (with Brass Ferrules)	8157–330
139804	5a	Armature, complete for Aa (with Hd. Dr. Copper Ferrules)	8157–330
73494	6	Hex Nut	8265–126
139453	7	Front Contact Spring, complete	8385–2049
139455	8	Back Contact Spring, complete	8385–2050
139471	9	Terminal Connector	B–9990–11
35324	10	Ins. Bushing	8095–412
1515	11	Hex. Nut for 10	8109–23
74573	12	Lock Washer for 6	8486–197
139464	13	Front Posts, complete with Graphite Tip	8094–2166
139466	14	Back Post, complete with Graphite Tip	8094–2167

UNION SWITCH & SIGNAL CO.

STYLE ANL-21 POWER TRANSFER RELAY (Continued)

Order by Plate, Piece, Reference and Description

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
412779	15	Terminal Board only	410167
139467	16	Terminal Board only	9968–760
	17	Terminal Post, complete, with Nuts and Washers ("Z" dimension $1\frac{13}{16}$")	12451–
135302	17a	Terminal Posts only	8094–1192
	18	Terminal Post, complete with Nuts and Washers ("Z" dimension $2\frac{1}{4}$")	12451–
113978	18a	Terminal Post only	8094–1192
	19	Terminal Post, complete with Nuts and Washers ("Z" dimension $1\frac{9}{16}$")	12451–
122782	19a	Terminal Post only	8094–1192
29104	20	Washer	7828–138
29103	21	Hex. Nuts only	8109–194
29102	22	Washer	7828–139
29101	23	Hex. Nut only	8109–193
	24	Machine Screw No. 8-36x$\frac{1}{2}$" Flat Hd. Br. (Nickel Plated) Spec. 1217	
139805	25	Cover only	C–9129–1
94344	26	Hex. Nut only	8265–70
139807	27	Clip only	11893–318
54928	28	Rivet	10301–21
137954	29	Glass Shield	8163–274

UNION SWITCH & SIGNAL CO.

STYLE ANL-21 POWER TRANSFER RELAY
(Continued)

Order by Plate, Piece, Reference and Description

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
139458	30	Contact Spring Board	8750–2236
139457	31	Insulation	8750–2235
139472	32	Lock Washer	8486–155
139462	33	Screw	8098–491
139456	34	Insulation	8750–2234
45303	35	Eyelet	8064–299
139469	36	R. H. Terminal Connector, Complete	8064–616
139470	37	L. H. Terminal Connector, Complete	8064–616
	38	Mach. Screw No. 4-48x¼" Rd. Hd. S. (Cad. Pl. Spec. 1326)	
	39	Machine Screw No. 6-40x⅜" Rd. Hd. Br. (N. P.)	
141606	40	Lead Support	8750–2252
141607	41	Lead Support	8750–2252
139840	42	Insulation	8750–1415
37417	43	Rivet	10301–21

Section
E

Plate E-1175

RELAYS, INDICATORS AND ELECTRIC LOCKS

Style ANL-30
Power Transfer Relay

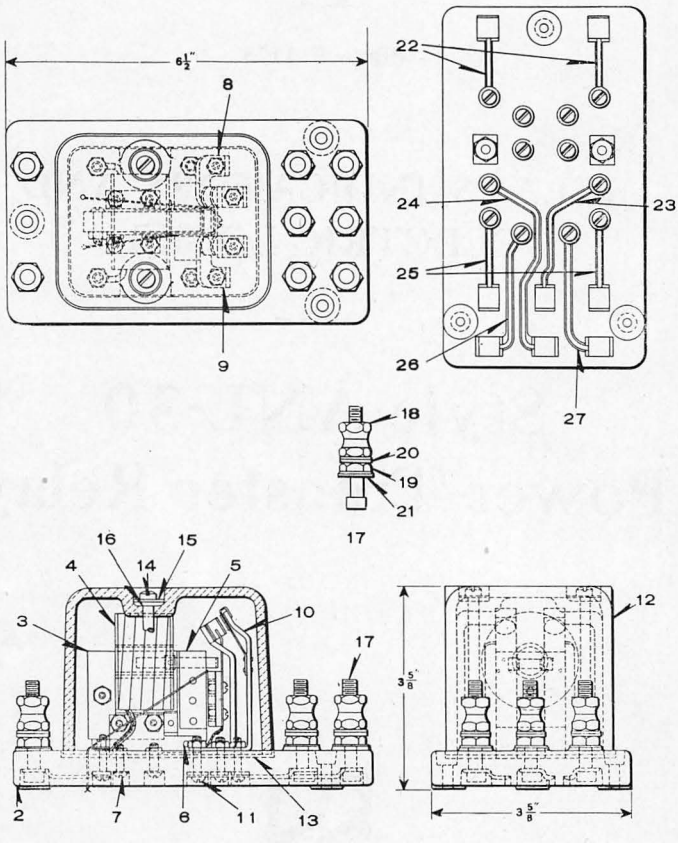
Union Switch & Signal Co.
Swissvale, Pa.

9-28

Printed in U.S.A.

PLATE E-1175

UNION SWITCH & SIGNAL COMPANY



A

STYLE ANL-30 POWER TRANSFER RELAY

The ANL-30 relay is wound for any voltage up to 110 volts 60 cycles or 55 volts 25 cycles. It is recommended for use as a power transfer relay to cut over from A. C. to D. C. supply at interlockings, automatic block signaling and highway crossing installations. The maximum contact combination of the ANL-30 is two front and two back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

STYLE ANL-30 POWER TRANSFER RELAY

Order by Plate, Piece, Reference and Abbreviated Description Shown in Heavy Face Type Only

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
143738	**A**	**Style ANL-30 Power Transfer Relay,** complete with two front and two back contacts, 110 volts, 60 cycles, spec. 1716 (Without Glass Cover)	B–12635–2
145199	**Aa**	**Style ANL-30 Power Transfer Relay,** complete with two front and two back contacts, 110 volts, 60 cycles, spec. 1716, with Glass Cover	B–12635–2
143739	**Ab**	**Style ANL-30 Power Transfer Relay,** complete with two front and two back contacts, 8-10 Volts, 60 cycles, spec. 1717 with Glass Cover	B–12635–2
149099	**Ac**	**Style ANL-30 Power Transfer Relay,** complete with two front and two back contacts, 10-12 volts, 60 cycles, spec. 1854 with Glass Cover	B–12635–2
146780	**Ad**	**Style ANL-30 Power Transfer Relay,** complete with two front and two back contacts, 12-15 volts, 60 cycles, or 8-10 volts, 25 cycles, spec. 1805, with Glass Cover	B–12635–2
150099	**Ae**	**Style ANL-30 Power Transfer Relay,** complete with two front and two back contacts, 12-15 volts, 60/100 cycles, spec. 1805, with Glass Cover (Unsealed)	B–12635–2
143721	**2**	**Base** only	9968–801
143713	**3**	**Magnet Core**	8101–321
143720	**4**	**Coil, 110 volts, 60 cycles**	8133–361
143737	**4a**	**Coil, 8-10 volts, 60 cycles**	8133–361
149098	**4b**	**Coil, 10-12 volts, 60 cycles**	8133–361
146779	**4c**	**Coil, 12-15 volts, 60 cycles**	8133–361
150098	**4d**	**Coil, 12-15 volts, 60/100 cycles**	8133–374

UNION SWITCH & SIGNAL COMPANY

STYLE ANL-30 POWER TRANSFER RELAY

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Shown in Heavy Face Type Only

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
143735	**5**	**Armature,** complete	8358–464
143730	**6**	**Pin** only	8097–852
	7	**Machine Screw No. 6-40x$\frac{5}{8}$″** Rd. Hd. S. (Cad. Pl.) complete with Washer Ref. 7a and Hex. Nut Ref. 7b.	
113126	**7a**	**Washer** only for 7	7826–249
48193	**7b**	**Hex. Nut** only for 7	8265–150
143728	**8**	**R. H. Front Contact Spring,** complete	8385–2089
143729	**9**	**L. H. Front Contact Spring,** complete	8385–2089
143725	**10**	**Back Contact Spring,** complete	8385–2088
	11	**Machine Screw No. 8-36x$\frac{11}{16}$″** Rd. Hd. Br. (N. P.) complete with two Washers Ref. 11a and Hex. Nut Ref. 11b.	
17376	**11a**	**Washer** only for 11	7828–66
28166	**11b**	**Hex. Nut** only for 11	8109–192
143717	**12**	**Glass Cover**	8163–295
143610	**13**	**Gasket**	8078–1440
	14	**Machine Screw No. 10-30x3$\frac{1}{4}$″** Fil. Hd. S. (Cad. Pl.) complete with Hex. Nut Ref. 14a and Washer Ref. 15, for attaching cover to base.	
73488	**14a**	**Hex. Nut** only for 14	8265–11
73493	**15**	**Washer** for 14	7826–78
27182	**16**	**Gasket** for 14	8078–422

UNION SWITCH & SIGNAL COMPANY

STYLE ANL-30 POWER TRANSFER RELAY

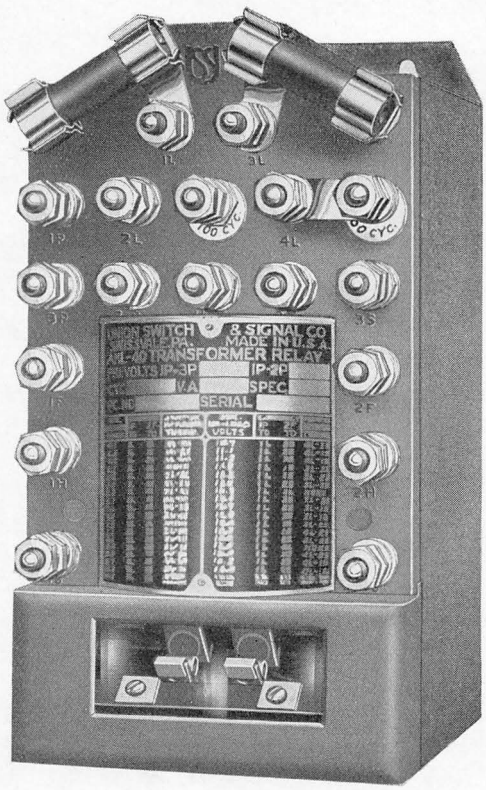
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Shown in Heavy Face Type Only

Drawing references are shown for convenience in checking material with shipping lists and invoices.

Piece	Ref.	Description	Drawing Reference
	17	**Terminal Post, with Nuts and Washers** (Includes 1-17a, 2-18, 1-19, 2-20 and 1-21)	12451–
122782	**17a**	**Terminal Post,** only for 17	8094–1192
29101	**18**	**Hex. Nut,** only for 17	8109–193
29103	**19**	**Hex. Nut,** only for 17	8109–194
29102	**20**	**Washer,** only for 17	7828–139
29104	**21**	**Washer,** only for 17	7828–138
144027	**22**	**Connector**	8064–637
144030	**23**	**Connector**	8064–637
144029	**24**	**Connector**	8064–637
144028	**25**	**Connector**	8064–637
144031	**26**	**Connector**	8064–638
144032	**27**	**Connector**	8064–638

UNION SWITCH & SIGNAL CO.



Height 9⅛", Width 5⅛", Depth 6⅛"

STYLE "ANL-40" TRANSFORMER RELAY

For Lighting and Power Transfer Service

The Style "ANL-40" Transformer Relay combines in one instrument a lighting transformer and a power transfer relay. These elements are so combined that a wide range of lamp voltages may be obtained. Diagram Fig. 1 on the opposite page shows how, for every lamp voltage either of the fuses will, if blown, de-energize the relay thus providing continuous lighting from the D. C. Stand-by source. By referring to the internal wiring diagram the relation of the various parts may be traced. It will be noted that by removing link "X" separate control of the relay winding may be effected when desirable.

This relay may be operated on either 60 cycles or 100 cycles by changing one external connection on the terminal board.

It is furnished with two front and two back non-independent Contacts.

UNION SWITCH & SIGNAL CO.

STYLE "ANL-40" TRANSFORMER RELAY

For Lighting and Power Transfer Service

For Details of Relay Refer to Plate E-1181

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
183099	**A**	**Style "ANL-40" Transformer Relay,** 150 V.A., 110 Volts, 60/100 Cycles. Secondary Voltages of from 4.1 to 16.5 Volts in 35 equal steps, Spec. 2421.....	C–9416–1

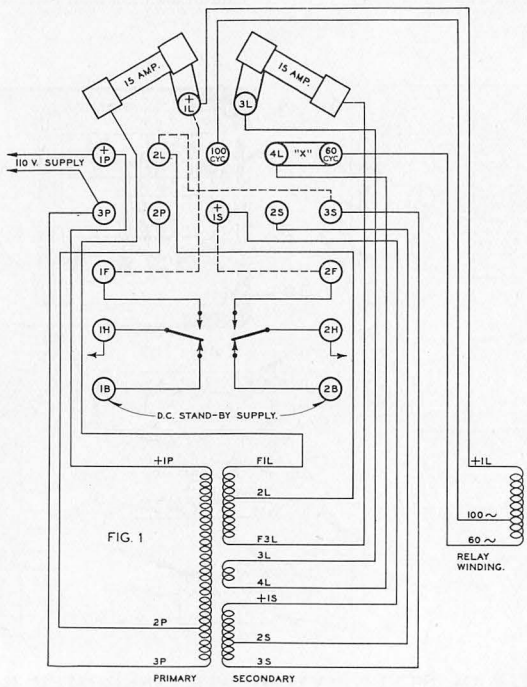
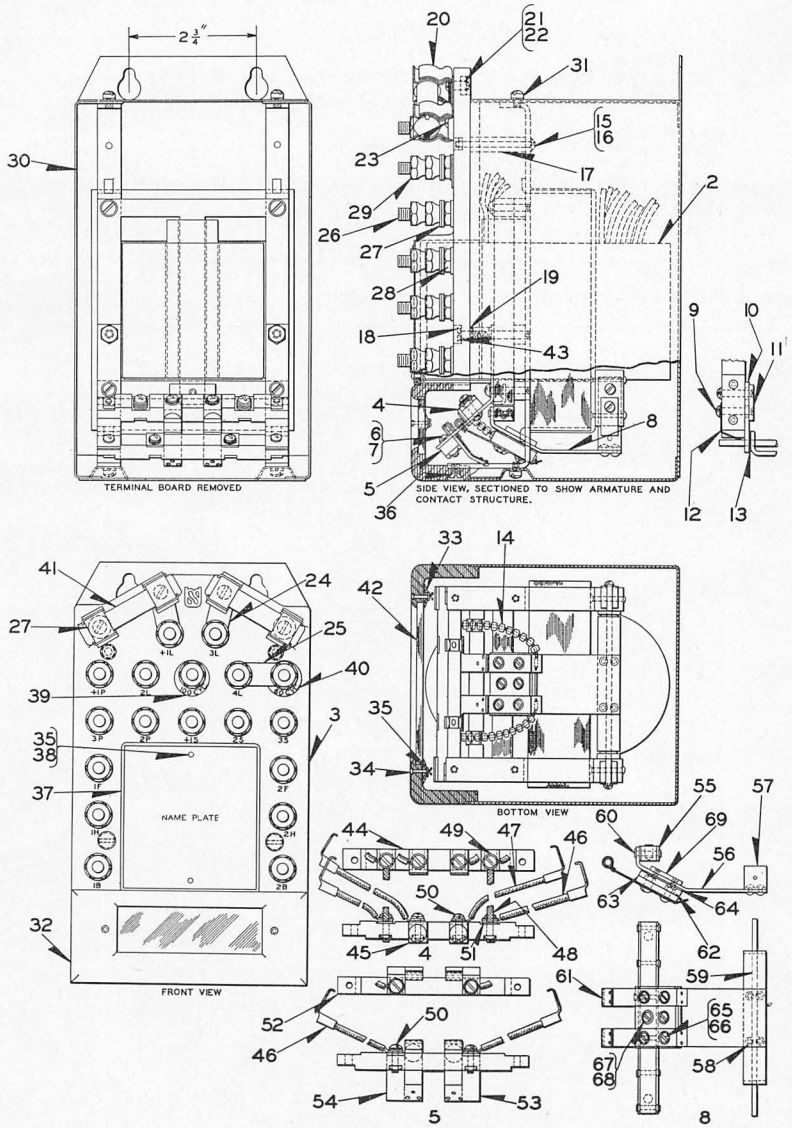


FIG. 1

PLATE E-1181

UNION SWITCH & SIGNAL CO.



DETAILS OF STYLE "ANL-40" TRANSFORMER RELAY

UNION SWITCH & SIGNAL CO.

STYLE "ANL-40" TRANSFORMER RELAY

DETAIL PARTS

For Complete Relay Refer to Plate E-1180

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
182915	**2**	**Field Complete,** 110-Volts, 60/100 Cycles, Spec. 2421	C–9415–1
183095	**3**	**Terminal Board**	C–9415–2
182908	**4**	**Front Contact Board Complete,** with Posts, Leads and Connectors	9968–1110
182900	**5**	**Back Contact Board Complete,** with Contacts, Leads, Nuts and Washers	9968–1108
	6	**Machine Screw No. 6-40x½″** Rd. Hd. Br. (N.P.) with No. 6 Pl. S. Lock Washer ($\frac{5}{64}$″x$\frac{1}{32}$″) (Cad. Pl.) and Nut Ref. 7	
151836	**7**	**Nut**	8109–445
182887	**8**	**Armature Complete,** with Contacts	8157–410
	9	**Machine Screw, No. 6-40x¾″** Rd. Hd. Br. (N. P.) with No. 6 Pl. S. Lock Washer ($\frac{5}{64}$″x$\frac{1}{32}$″) (Cad. Pl.)	
182880	**10**	**Armature Support**	11893–682
182912	**11**	**Nut**	8109–469
182911	**12**	**Spring**	8735–777
57032	**13**	**Washer**	7828–218
	14	**Porcelain Ins. Bead**	
	15	**Machine Screw, No. 8-36x1⅝″** Fil. Hd. S. (Cad. Pl.) with No. 8 Pl. S. Lock Washer ($\frac{1}{16}$″x$\frac{3}{64}$″) (Cad. Pl.) and Nut Ref. 16	
32498	**16**	**Nut**	8109–223
183236	**17**	**Ins. Bushing**	B–10269–1
	18	**Machine Screw, No. 8-36x½″** Flat Hd. Br. (N. P.)	

UNION SWITCH & SIGNAL CO.

STYLE "ANL-40" TRANSFORMER RELAY
(Continued)

DETAIL PARTS

For Complete Relay Refer to Plate E-1180

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
58930	**19**	**Washer**	7828–218
	20	**Fuse Clip,** 30 Amp., 250-Volts, Type "C"	8064–749
	21	**Machine Screw, No. 10-30x$\frac{7}{16}$"** Rd. Hd. Br. (N. P.) with Nut Ref. 22	
44230	**22**	**Nut** for Refs. 21 and 23	8109–281
	23	**Machine Screw, No. 10-30x$\frac{5}{8}$"** Rd. Hd. Br. (N. P.) with Nut Ref. 22	
56781	**24**	**Connector**	8064–349
135650	**25**	**Connector**	8064–596
	26	**Terminal Post Complete,** with Nuts and Washers (Inc. 1-26a, 3-27, 1-28 and 2-29)	12451–
122782	**26a**	**Terminal Post Only,** for Ref. 26	8094–1192
29102	**27**	**Washer**	7828–139
29103	**28**	**Nut**	8109–194
29101	**29**	**Nut**	8109–193
183098	**30**	**Case**	C–9415–3
	31	**Machine Screw, No. 8-36x$\frac{1}{4}$"** Fil. Hd. S. (Cad. Pl.) with No. 8 Pl. S. Lock Washer ($\frac{1}{16}$"x$\frac{3}{64}$") (Cad. Pl.)	
183096	**32**	**Bottom Cover**	C–9415–2
47103	**33**	**Spring Washer**	7828–211
60845	**34**	**Pin** (N. P.)	8097–837
138309	**35**	**Washer** for Refs. 34 and 38	7828–184

UNION SWITCH & SIGNAL CO.

STYLE "ANL-40" TRANSFORMER RELAY
(Continued)

DETAIL PARTS

For Complete Relay Refer to Plate E-1180

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	36	**Machine Screw, No. 8-36x$\frac{5}{16}$″** Flat Hd. Br. (N. P.)	
183125	37	**Name Plate**	8225–446
60286	38	**Pin** (N. P.) for attaching Name Plate to Case	8097–837
142777	39	**Tag** (Marked 100 Cycles)	8988–75
142777	40	**Tag** (Marked 60 Cycles)	8988–75
	41	**A. C. Fuse**, 2″ Lg. x $\frac{9}{16}$″ dia. (15-Amp., 250-Volts)	
183251	42	**Glass Shield**	8163–309
34744	43	**Washer**	7828–69
182901	44	**Terminal Board**	9968–1109
182903	45	**Front Contact Post Complete**	8094–2310
182904	46	**Lead Complete**	B–9990–31
182905	47	**Lead Complete**	B–9990–31
182907	48	**Connector**	10934–45
	49	**Machine Screw, No. 6-40x½″** Rd. Hd. Br. (N. P.) with No. 6 Pl. S. Lock Washer ($\frac{5}{64}$″x$\frac{1}{32}$″) (Cad. Pl.), Nut Ref. 7 and two Washers Ref. 51	
	50	**Machine Screw, No. 6-40x½″** Rd. Hd. Br. (N. P.) with No. 6 Pl. S. Lock Washer ($\frac{5}{64}$″x$\frac{1}{32}$″) (Cad. Pl.), Nut Ref. 7 and one Washer Ref. 51	
20686	51	**Washer**	7828–108
182894	52	**Terminal Board**	9968–1107
182897	53	**R. H. Contact Complete**	8385–2353

UNION SWITCH & SIGNAL CO.

STYLE "ANL-40" TRANSFORMER RELAY (Continued)

DETAIL PARTS

For Complete Relay Refer to Plate E-1180

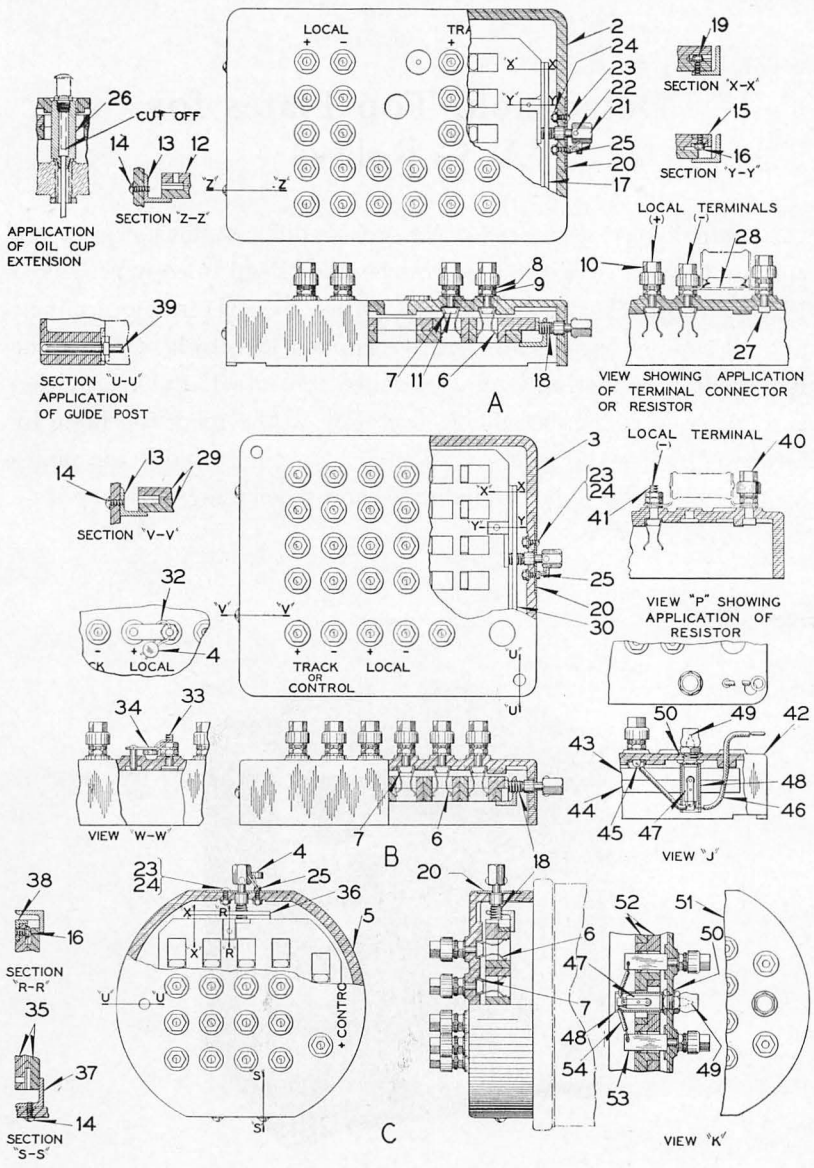
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
182898	**54**	**L. H. Contact Complete**	8385–2353
182885	**55**	**Armature Complete**	8157–408
182882	**56**	**Armature Bracket**	8303–123
182881	**57**	**Armature Bracket**	8303–121
54920	**58**	**Rivet**	10301–1
182886	**59**	**Armature Shaft**	8097–409
182884	**60**	**Pin**	8097–624
182906	**61**	**Contact Complete**	8385–2091
143714	**62**	**Insulation**	8750–2268
143715	**63**	**Insulation**	8750–2268
143716	**64**	**Insulation**	8750–2269
	65	**Machine Screw, No. 4-48x$\frac{9}{32}$″** Rd. Hd. Br. (N. P.) with No. 4 Shakeproof Lock Washer	
29351	**66**	**Nut**	8109–204
	67	**Machine Screw, No. 4-48x$\frac{1}{2}$″** Rd. Hd. Br. (N. P.) with Washer Ref. 68 and No. 4 Pl. S. Lock Washer ($\frac{5}{64}$″x$\frac{1}{32}$″) (Cad. Pl.)	
87225	**68**	**Washer**	7828–287
182883	**69**	**Nut**	8109–468

Detachable Top Plates for A. C. Relays

Detachable top plates for A.C. relays differ somewhat in design and application from the plug couplers described in copy preceding Plate E-5035. They are placed in position over the relay terminals and all contact springs are tightly clamped thereto by turning the hex knob on adjusting screw, reference 18 Plate E-1200. Provision is made to lock the detachable top plate to the relay top plate by means of a wire and lead seal. Some of these detachable top plates are equipped with indicator lights to show when relays are energized.

Detachable Top Plate applied and sealed to top plate of a Centrifugal Frequency Relay



Detachable Top Plates for A. C. Relays

(Centrifugal Frequency, Model 15, SV-12, SV-30, SV-20, SV-21, SLV-13, TV-30 and TV-40)

Detachable Top Plates for A. C. Relays

(Centrifugal Frequency, Model 15, SV-12, SV-30, SV-20, SV-21, SLV-13, TV-30 and TV-40)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
108863	**A**	**Detachable Top Plate Complete,** with Oil Cup extension Ref. 26 for A.C. Centrifugal Frequency Relay	C–9473–5
108889	**Aa**	**Detachable Top Plate Complete,** with Terminal Connector Ref. 28 and oil cup extension Ref. 26 for A.C. Centrifugal Frequency Relay (Will mount Local Resistor)	C–9473–5
224244	**Ab**	**Detachable Top Plate Complete,** with one Guide Post Ref. 39 for "TV-30" and "TV-40" Relays	C–9473–7
191925	**B**	**Detachable Top Plate Complete,** with two guide posts Ref. 39 for Models 15, SV-12 and SV-30 Relays (May be used with Relays having independent contacts or having a bakelite Top Plate)	C–9473–3
222857	**Ba**	**Detachable Top Plate Complete,** with indicator light per View "J" and two guide posts Ref. 39 for Models 15, SV-12 and SV-30 Relays (May be used with Relays having independent contacts or having a bakelite Top Plate)	C–9473–3
	Bb	**Detachable Top Plate Complete,** with two guide posts Ref. 39, for Model 15 Track Relay having a Local Resistor per View "P" (May be used with Relays having Bakelite Top Plate only)	C–9473–3
215239	**Bc**	**Detachable Top Plate Complete,** with seal per View "W-W" and two guide posts Ref. 39 for "SV-20" and "SV-21" Relays (May be used with Relays having independent contacts or having a Bakelite Top Plate)	C–9473–3
222859	**Bd**	**Detachable Top Plate Complete,** with indicator light per View "J", seal per View "W-W" and two guide posts Ref. 39 for "SV-20" and "SV-21" Relays (May be used with Relays having independent contacts or having a Bakelite Top Plate)	C–9473–3
191924	**C**	**Detachable Top Plate Complete,** with guide post Ref. 39 for "SLV-13" Relay (May be used with Relays having independent contacts or having a Bakelite Top Plate)	C–9473–1

Detachable Top Plates for A. C. Relays

(Centrifugal Frequency, Model 15, SV-12, SV-30, SV-20, SV-21, SLV-13, TV-30 and TV-40)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
222858	Ca	**Detachable Top Plate Complete,** with indicator light per View "K" and guide post Ref. 39 for "SLV-13" Relay (May be used with Relays having independent contacts or having a Bakelite Top Plate)	C–9473–1
108862	2	**Top Plate Only** for Refs. A and Aa	C–9472–6
223918	2a	**Top Plate Only** for Ref. Ab	C–9472–7
211882	3	**Top Plate Only** for Refs. B, Bb and Bc	C–9472–2
47608	4	**Seal**	8988–12
191344	5	**Top Plate Only** for Ref. C	C–9472–4
191575	6	**Contact Spring**	8385–2422
	7	**Terminal Post** with Nuts, Washers, Insulated Nut and Nut Lock (Inc. 1-6, 1-7a, 3-8, 2-9, 1-10 and 1-11)	12451–
109439	7a	**Terminal Post Only** for Ref. 7	8094–2412
29102	8	**Washer**	7828–139
29103	9	**Nut**	8109–194
105713	10	**Insulated Nut**	12770–1
109438	11	**Nut Lock**	8486–310
108861	12	**Clamp Plate** for Refs. A and Aa	C–9472–5
223919	12a	**Clamping Plate** for Ref. Ab	C–9472–8
105819	13	**Guide Bracket** for Refs. A, Aa, B, Ba, Bb, Bc and Bd	10914–999
224564	13a	**Guide Bracket** for Ref. Ab	10914–1231
	14	**Machine Screw,** No. 10-30x½″ Rd. Hd. Br. (N.P.) with No. 10 S. Lock Washer (N.P.).	
191695	15	**Reinforcing Bracket** for Refs. A, Aa, B, Ba, Bb, Bc and Bd	10914–653
224562	15a	**Reinforcing Bracket** for Ref. Ab	10914–1229

Detachable Top Plates for A. C. Relays

(Centrifugal Frequency, Model 15, SV-12, SV-30, SV-20, SV-21, SLV-13, TV-30 and TV-40)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	16	**Machine Screw,** No. 10-30x$\frac{5}{16}$" Fil. Hd. Br. (N.P.) with No. 10 S. Lock Washer (N.P.).	
215727	**17**	**Guide Bracket** for Refs. A and Aa	10914–655
224563	**17a**	**Guide Bracket** for Ref. Ab	10914–1230
	18	**Adjusting Screw** with Knob and Rivet (Inc. 1-18a, 1-20, 1-21 and 1-22) for all references except Ab	12471–
191736	**18a**	**Adjusting Screw Only** for Ref. 18	8190–390
	18b	**Adjusting Screw with Knob and Rivet** (Inc. 1-18c, 1-20, 1-21 and 1-22) for Ref. Ab	12471–
224567	**18c**	**Adjusting Screw Only** for Ref. 18b	8190–390
	19	**Machine Screw,** No. 10-30x½" Fil. Hd. Br. (N.P.) with No. 10 S. Lock Washer (N.P.).	
191749	**20**	**Name Plate**	8225–471
191739	**21**	**Knob**	8235–169
54921	**22**	**Rivet**	10301–1
	23	**Machine Screw,** No. 8-36x½" Rd. Hd. Br. (N.P.) with No. 8 S. Lock Washer (N.P.) and Nut Ref. 24.	
32498	**24**	**Nut**	8109–223
	25	**Screw** with No. 8 Lock Washer (N.P.) and Nut Ref. 24	12471–
52888	**25a**	**Screw Only**	8098–670
108888	**26**	**Oil Cup Extension** for Refs. A and Aa	8350–948
	27	**Terminal Post** with Nuts and Washers (Inc. 1-27a, 3-8, 3-9 and 1-10)	12451–
186848	**27a**	**Terminal Post Only**	8094–2207
141963	**28**	**Terminal Connector**	8064–305

Detachable Top Plates for A. C. Relays

(Centrifugal Frequency, Model 15, SV-12, SV-30, SV-20, SV-21, SLV-13, TV-30 and TV-40)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
191295	29	**Clamp Plate** for Refs. B, Bb and Bc	C–9472–1
191733	30	**Guide Bracket** for Refs. B, Ba, Bb, Bc and Bd	10914–655
142777	31	**Tag** (Not shown) (Orders should specify marking desired)	8988–75
	32	**Seal Wire** (Cad. Pl.) (Orders should specify length desired).	
	33	**Terminal Post** with Nuts and Washers (Inc. 1-33a, 1-8 and 2-9)	12451–
108085	33a	**Terminal Post Only**	8094–2403
108087	34	**Sealing Plate Complete** for Refs. Bc and Bd	12538–223
191327	35	**Clamp Plate** for Ref. C	C–9472–3
191731	36	**Guide Bracket** for Refs. C and Ca	10914–654
105714	37	**Guide Bracket** for Refs. C and Ca	10914–958
191701	38	**Reinforcing Bracket** for Refs. C and Ca	10914–653
191757	39	**Guide Post** for Refs. B, Ba, Bb, Bc, Bd, C and Ca	8114–873
	40	**Terminal Post** with Nuts, Ins. Nut and Washers (Inc. 1-7a, 4-8, 2-9 and 1-10)	12451–
	41	**Terminal Post** with Nuts, Washers, Nut Lock and Spring (Inc. 1-41a, 1-6, 2-8, 2-9 and 1-11)	12451–
109488	41a	**Terminal Post Only** for Ref. 41	8094–2412
224792	42	**Top Plate Only** for Refs. Ba and Bd (with holes for indicator light)	C–9472–2
224874	43	**Clamp Plate** for Refs. Ba and Bd	C–9472–1
224875	44	**Clamp Plate** for Refs. Ba and Bd	C–9472–1
224790	45	**Terminal** for Refs. Ba and Bd	8244–43
224788	46	**Lead Complete** for Refs. Ba and Bd	B–9991–19
224784	47	**Lamp Socket Complete** for Refs. Ba, Bd and Ca	12522–31

Detachable Top Plates for A. C. Relays

(Centrifugal Frequency, Model 15, SV-12, SV-30, SV-20, SV-21, SLV-13, TV-30 and TV-40)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
224787	48	**Insulating Tube** for Refs. Ba, Bd and Ca	8095–753
	49	**Lamp** (C.N. 71543) for Refs. Ba, Bd and Ca.	
224785	50	**Washer**	7828–287
224877	51	**Top Plate Only,** for Ref. Ca (with hole for indicator light)	C–9472–4
224876	52	**Clamp Plate** for Ref. Ca	C–9472–3
224786	53	**Terminal** for Ref. Ca	8244–170
185764	54	**Lead** for Ref. Ca	B–9998–16

Section
E

Plates E-4800 to E-5030, Inc.

RELAYS, INDICATORS AND ELECTRIC LOCKS

D.C. Relays

Model 12 Polarized, Model 13 and Style DN-11 Neutral

Union Switch & Signal Co.
Swissvale, Pa.

4-29

Printed in U. S. A.

UNION SWITCH & SIGNAL COMPANY

SECTION E

Plates E-4800 to E-5030 Inc.

MODEL 12 POLARIZED, MODEL 13 AND STYLE DN-11 NEUTRAL RELAYS

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GENERAL INFORMATION

D.C. RELAYS

Model 13 Neutral and Model 12 Polarized Relays

This group of relays represents the types that have been standard for a good many years to meet A.R.A. Specification.

One change recently made has been the rounding of all silver tips on contact springs. The catalog plates which follow show the standard rounded tips on all contact fingers. In the types of circuits that are being used today this type of contact has been found to be better suited for general use than the straight silver tip. Contact resistances with this combination are practically the same as heretofore.

The usual arrangements to make relays slow release or quick release are available as heretofore.

Many of these relays have been used with wall mounting and with shock absorbing springs, details of which appear in the catalog plates which follow.

Style DN-11 Neutral Relay

In the Union DN-11 relays for track and line use there are three outstanding features of merit—size, simplicity and calibration.

The four point relay is 6¼″ square by 8″ in height. All sizes are designed for either wall or shelf mounting. All base structures are equipped with lugs which support the relay and also provide a means of attaching shock absorbing springs which, when applied, increases the height of the relay by approximately one half an inch. The standard arrangement for all relays is the shelf type, but for wall mounting a bracket may be attached to the top plate. This bracket serves as a spring member to minimize the effects of vibration and is furnished on separate order or attached to relay as specified. Shock absorbing springs for shelf mounting are furnished only when specified. Both wall mounting brackets and shock absorbing springs can be ordered at any time and applied to the relays in the field.

The terminal posts are designed so that the various rows are at different levels to facilitate the making of wire connections. All openings in the top plates are permanently sealed to prevent water from entering the relay.

The graphite contact members are the new "V" type designed to provide uniform wear without pitting and to maintain low contact resistance. The contact fingers consist of the spring member only, a flat spring attached rigidly to a reliable bakelite support. The simplicity of this member eliminates the possibility of distortion. The standard combination is silver to graphite for low voltage front contacts and silver to silver for back contacts. Graphite to graphite for high voltage service is available, and articulated fingers with gauze contacts providing individual adjustment for each contact are also available.

The calibration for the 4 ohm four point track relay drop-away with and without spring pressure is maintained at 0.037 ampere and 0.015 ampere respectively, the same as provided for in A.R.A. specifications and practice for many years. The values for maximum pick-up working current have been brought together and are lower than the direct pick-up on previous relays.

Relays are furnished in the four, six, eight, and ten point sizes for all standard resistances as listed herein.

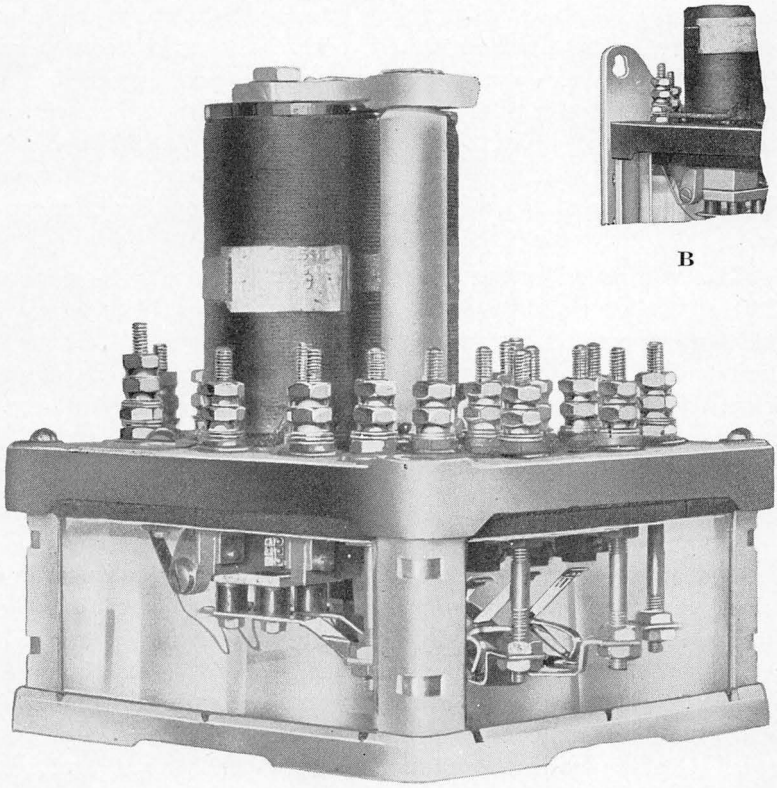
Slow releasing coils are available for all of these relays when specified and we are likewise able to furnish an arrangement for making the standard relays quick acting where requirements make it necessary. Where extremely quick shunting action is desirable for detector circuits, a special handling is necessary, which involves in addition to the use of the regular arrangement for quick acting, a probable change in connections of coils and the use of a series resistor. All arrangements for making relays quick acting bring about an increase in operating characteristics and it is suggested that problems of this nature be taken up with our Engineering Department who will be glad to analyze the particular problems involved.

CONTACT CARRYING CAPACITY

Contacts for Model 12 Polar and Model 13 and Style DN-11 Neutral Relays are designed for a continuous carrying capacity of 3 Amperes and intermittent capacity of 5 Amperes for 30 seconds.

PLATE E-4800

UNION SWITCH & SIGNAL COMPANY



B

A

MODEL 12 POLARIZED RELAY
WITH TWO NORMAL AND TWO REVERSE POLAR CONTACTS

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back neutral and silver to graphite polar contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4825 and E-5030).

The Maximum contact combination is four front and two back non-independent neutral and two normal and two reverse non-independent polar contacts, or four front and four back non-independent neutral and two normal and two reverse non-independent polar contacts.

UNION SWITCH & SIGNAL COMPANY

MODEL 12 POLARIZED RELAYS
TWO NORMAL AND TWO REVERSE POLAR CONTACTS

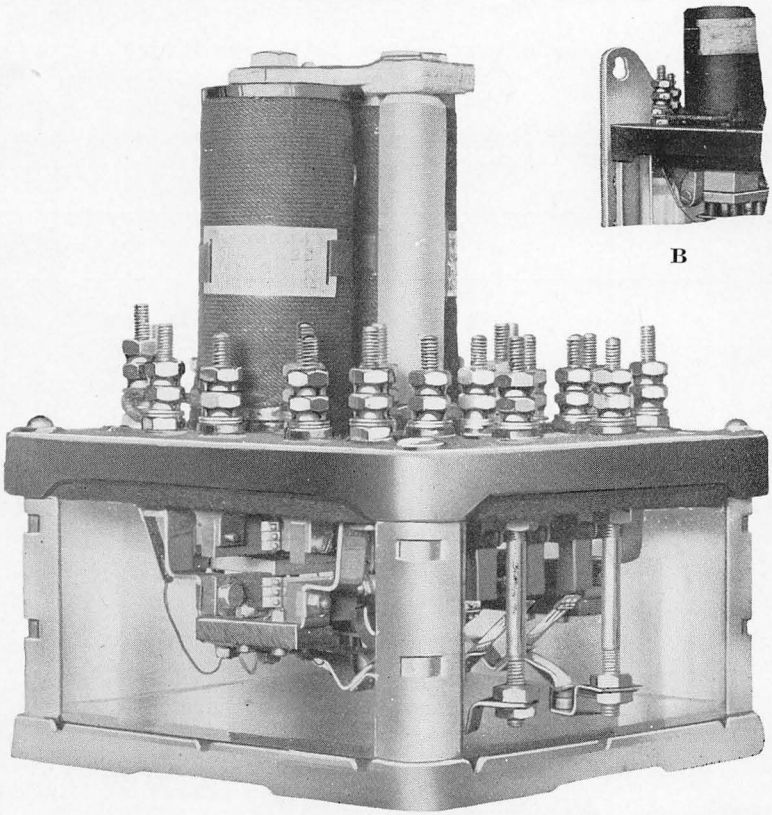
For Details Refer to Plate E-4825 and E-4826

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Model 12 (Shelf Type) Polarized Relay, Magnets Ohms per Pair,** with four front and two back low voltage non-independent neutral contacts and two normal and two reverse non-independent polar contacts	C–8140–7
	Aa	**Model 12 (Shelf Type) Polarized Relay, Magnets Ohms per Pair,** with two front high voltage and two front and two back low voltage non-independent neutral contacts and two normal and two reverse non-independent polar contacts. Special adjustment on neutral armature contacts. Silver to Silver polar contacts. (For control of low voltage switch movements)	C–8140–7
	Ab	**Model 12 (Shelf Type) Polarized Relay, Magnets Ohms per Pair,** with four front and four back low voltage non-independent neutral contacts and two normal and two reverse non-independent polar contacts	C–8140–11
	B	**Model 12 (Wall Type) Polarized Relay, Magnets Ohms per Pair,** with four front and two back low voltage non-independent neutral contacts and two normal and two reverse non-independent polar contacts	C–8140–13
	Ba	**Model 12 (Wall Type) Polarized Relay, Magnets Ohms per Pair,** with two front high voltage and two front and two back low voltage non-independent neutral contacts and two normal and two reverse non-independent polar contacts. Special adjustment on neutral armature contacts. Silver to Silver polar contacts. (For control of low voltage switch movements)	C–8140–13
	Bb	**Model 12 (Wall Type) Polarized Relay, Magnets Ohms per Pair,** with four front and four four back low voltage non-independent neutral contacts and two normal and two reverse non-independent polar contacts	C–8140–14

PLATE E-4805

UNION SWITCH & SIGNAL COMPANY



B

A

MODEL 12 POLARIZED RELAY

WITH FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS

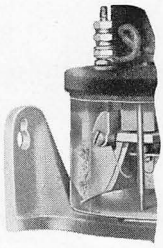
Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back neutral and silver to graphite polar contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

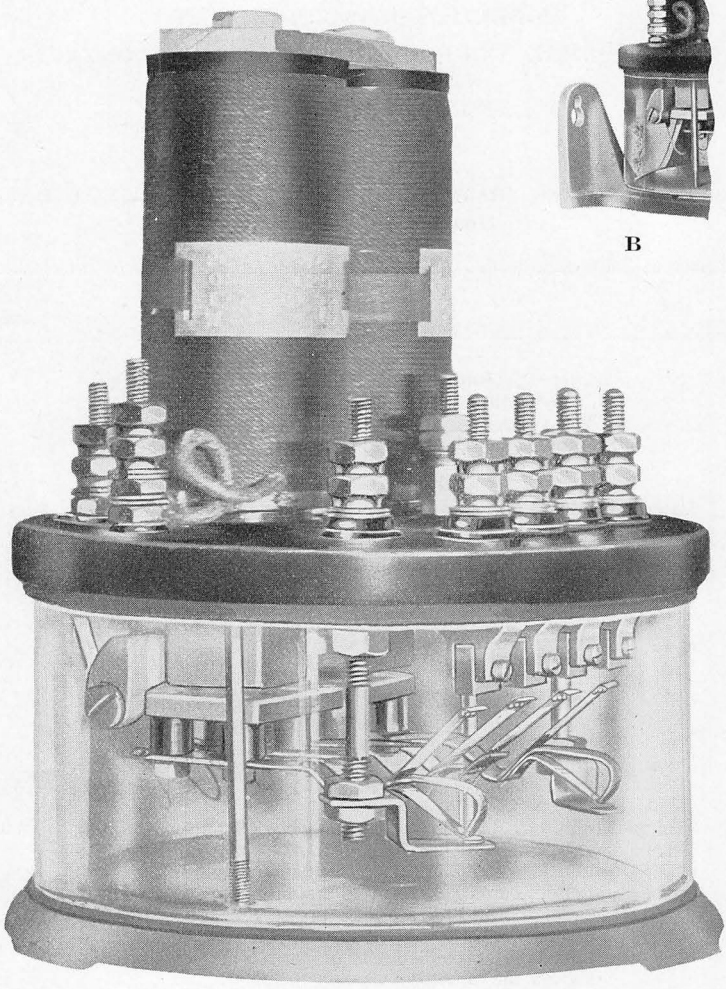
Shock absorber springs are not furnished unless called for. (See Plates E-4830 and E-5030).

The Maximum contact combination is four front and two back non-independent neutral and four normal and four reverse non-independent polar contacts.

UNION SWITCH & SIGNAL COMPANY



B



A

MODEL 13 D. C. NEUTRAL RELAY
TWO AND FOUR-POINT

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4535, E-4836 and E-5030).

The Maximum contact combination is four front and two back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

MODEL 12 POLARIZED RELAYS
FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS

For Details Refer to Plate E-4830

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Model 12 (Shelf Type) Polarized Relay, Magnets Ohms per Pair,** with four front and two back low voltage non-independent neutral contacts and four normal and four reverse non-independent polar contacts	C–8140–8
	Aa	**Model 12 (Shelf Type) Polarized Relay, Magnets Ohms per Pair,** with two front high voltage and two front and two back low voltage non-independent neutral contacts and four normal and four reverse non-independent polar contacts. Special adjustment on neutral armature contacts, silver to silver polar contacts (For control of low voltage switch movements)	C–8140–8
	B	**Model 12 (Wall Type) Polarized Relay, Magnets Ohms per Pair,** with four front and two back low voltage non-independent neutral contacts and four normal and four reverse non-independent polar contacts	C–8140–12
	Ba	**Model 12 (Wall Type) Polarized Relay, Magnets Ohms per Pair,** with two front high voltage and two front and two back low voltage non-independent neutral contacts and four normal and four reverse non-independent polar contacts. Special adjustment on neutral armature contacts, silver to silver polar contacts (For control of low voltage switch movements)	C–8140–12

UNION SWITCH & SIGNAL COMPANY

MODEL 13 D. C. NEUTRAL RELAYS
ROUND BASE

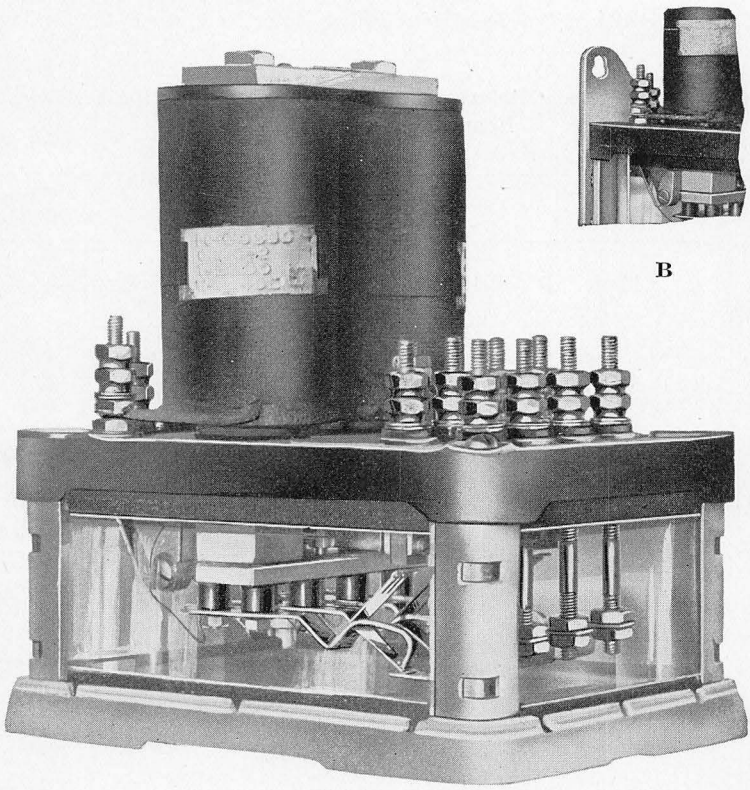
For Details of the Four-Point Relay Refer to Plate E-4835.
For Details of the Two-Point Relay Refer to Plate E-4836.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Model 13 (Shelf Type) D. C. Round Base Relay, Magnets Ohms per Pair,** complete with four front and two back low voltage non-independent contacts	C–8187–8
	Aa	**Model 13 (Shelf Type) D. C. Round Base Relay, Magnets Ohms per Pair,** complete with two front and two back low voltage non-independent contacts	C–8187–8
	B	**Model 13 (Wall Type) D. C. Round Base Relay, Magnets Ohms per Pair,** complete with four front and two back low voltage non-independent contacts	C–8187
	Ba	**Model 13 (Wall Type) D. C. Round Base Relay, Magnets Ohms per Pair,** complete with two front and two back low voltage non-independent contacts	C–8187

PLATE E-4813

UNION SWITCH & SIGNAL COMPANY



B

A

MODEL 13 D. C. NEUTRAL RELAY
(FOUR-POINT—SQUARE BASE)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4838 and E-5030).

The maximum contact combination is four front and four back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

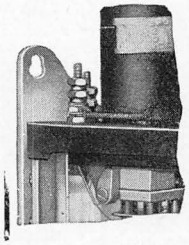
MODEL 13 D. C. NEUTRAL RELAYS
(FOUR-POINT—SQUARE BASE)

For Details of the Four-Point Relay Refer to Plate E-4838.

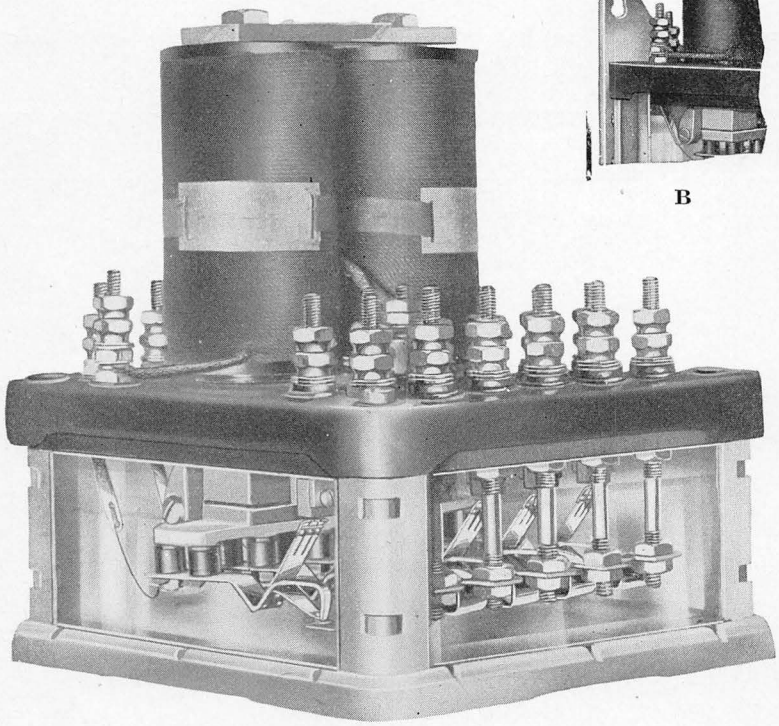
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Model 13 (Shelf Type) D. C. Square Base Relay, Magnets Ohms per Pair,** complete with four front and two back low voltage non-independent contacts	C–8187–10
	Aa	**Model 13 (Shelf Type) D. C. Square Base Relay, Magnets Ohms per Pair,** complete with four front and four back low voltage non-independent contacts	C–8187–10
	B	**Model 13 (Wall Type) D. C. Square Base Relay, Magnets Ohms per Pair,** complete with four front and two back low voltage non-independent contacts	C–8187–16
	Ba	**Model 13 (Wall Type) D. C. Square Base Relay, Magnets, Ohms per Pair,** complete with four front and four back low voltage non-independent contacts	C–8187–16

UNION SWITCH & SIGNAL COMPANY



B



A

MODEL 13 D. C. NEUTRAL RELAY
(SIX-POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4840 and E-5030).

The maximum contact combination is six front and six back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

MODEL 13 D. C. NEUTRAL RELAYS
(SIX-POINT)

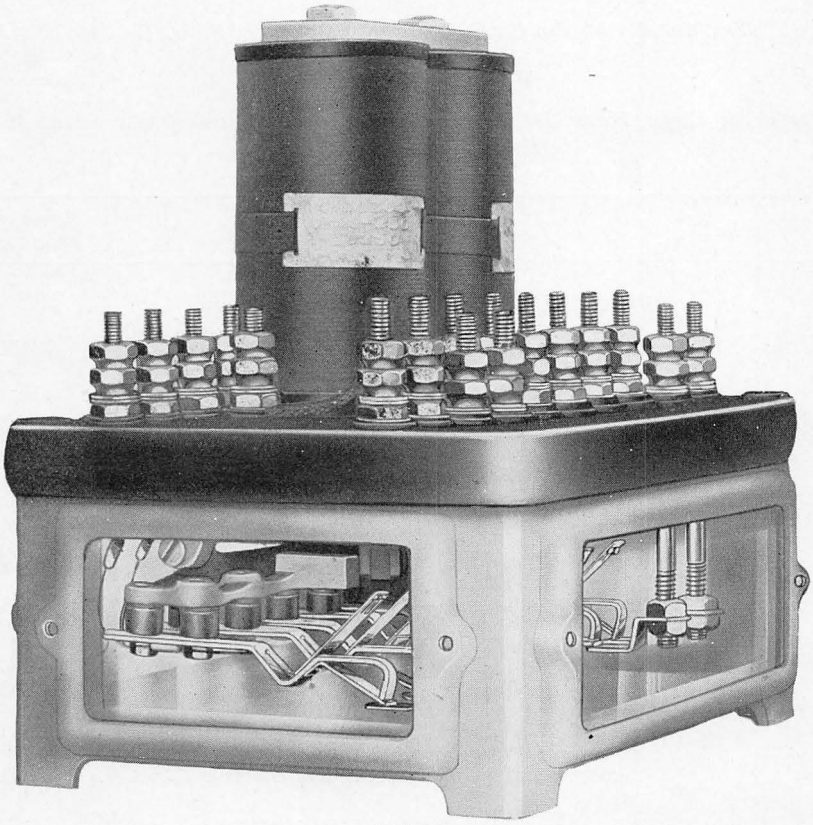
For Details of the Six-Point Relay Refer to Plate E-4840.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Model 13 (Shelf Type) D. C. Relay, Magnets Ohms per Pair,** complete with six front and two back low voltage non-independent contacts.....	C–8187
	Aa	**Model 13 (Shelf Type) D. C. Relay, Magnets Ohms per Pair,** complete with six front and four back low voltage non-independent contacts.....	C–8187
	Ab	**Model 13 (Shelf Type) D. C. Relay, Magnets Ohms per Pair,** complete with six front and six back low voltage non-independent contacts.....	C–8187
	B	**Model 13 (Wall Type) D. C. Relay, Magnets Ohms per Pair,** complete with six front and two back low voltage non-independent contacts.....	C–8187
	Ba	**Model 13 (Wall Type) D. C. Relay, Magnets Ohms per Pair,** complete with six front and four back low voltage non-independent contacts.....	C–8187
	Bb	**Model 13 (Wall Type) D. C. Relay, Magnets Ohms per Pair,** complete with six front and six back low voltage non-independent contacts.....	C–8187

PLATE E-4816

UNION SWITCH & SIGNAL COMPANY



A

MODEL 13 D. C. NEUTRAL RELAY
(EIGHT-POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4841 and E-5030).

The maximum contact combination is eight front and eight back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

MODEL 13 D. C. NEUTRAL RELAYS
(EIGHT-POINT)

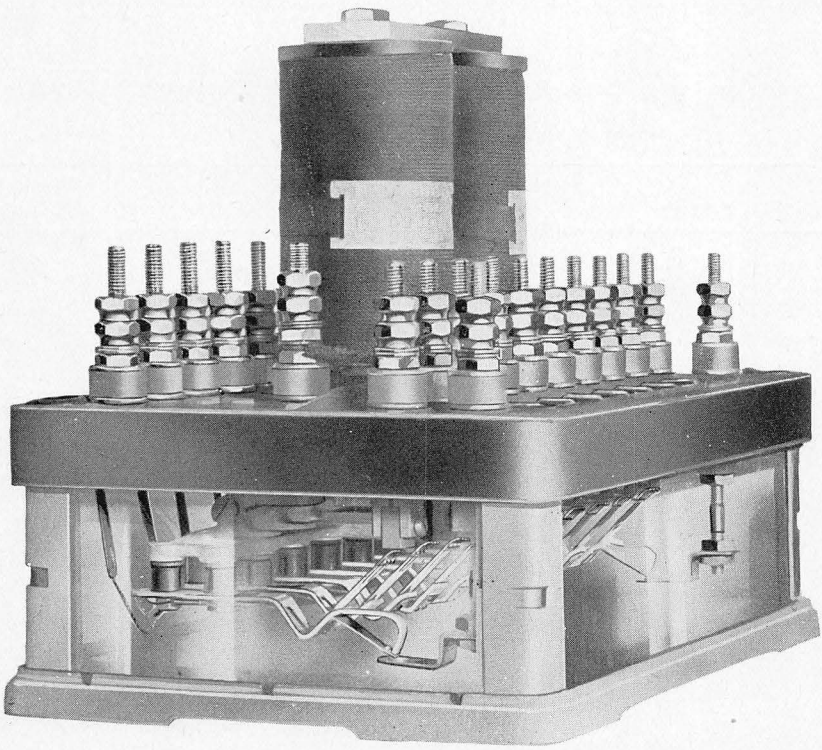
For Details of the Eight-Point Relay Refer to Plate E-4841.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Model 13 (Shelf Type) D. C. Relay, Magnets Ohms per Pair,** complete with eight front and two back low voltage non-independent contacts.....	C–8848–5
	Aa	**Model 13 (Shelf Type) D. C. Relay, Magnets Ohms per Pair,** complete with eight front and eight back low voltage non-independent contacts.....	C–8848–5

PLATE E-4817

UNION SWITCH & SIGNAL COMPANY



A

MODEL 13 D. C. NEUTRAL RELAY
(TEN-POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4842 and E-5030).

The maximum contact combination is ten front and ten back non-independent contacts.

Model 13 D. C. Neutral Relays (Ten-Point)

For Details of the Ten-Point Relay Refer to Plate E-4842.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Model 13 (Shelf Type) D. C. Relay, Magnets Ohms per Pair,** complete with ten front and two back low voltage non-independent contacts.....	C–8848–2
	Aa	**Model 13 (Shelf Type) D. C. Relay, Magnets Ohms per Pair,** complete with ten front and ten back low voltage non-independent contacts.....	C–8848–2

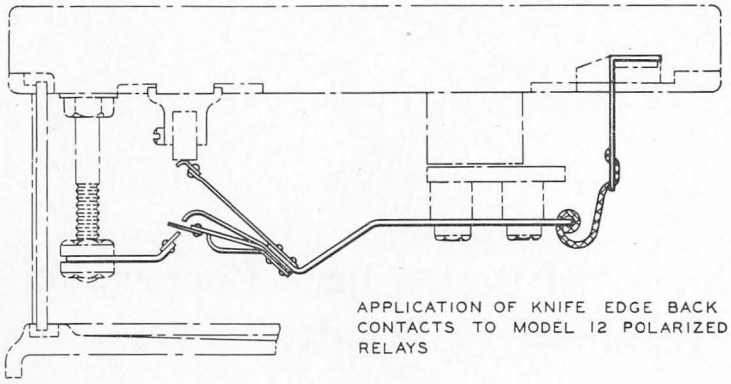
File Plates in Proper Sequence in Loose Leaf Covers

MEMORANDA

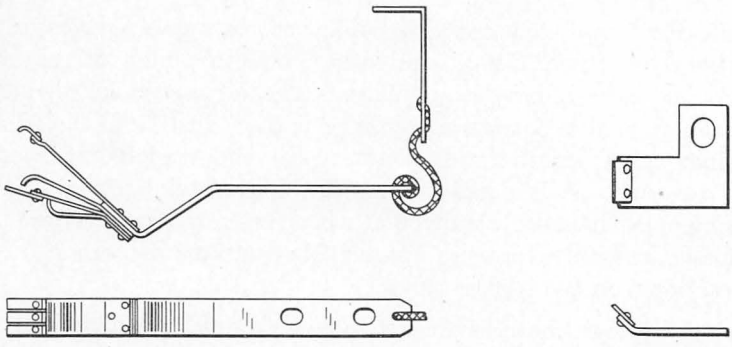
Improved Design Back Contacts for Model 12 Polarized Relays

Knife-edge type back contacts similar to the types that have proven so successful on Style DN-11 and other modern Union relays are now available for these older design relays. The advantage of this type of contact design is that foreign material or carbon dust from the front contact cannot collect on the back contact post and tend to introduce high contact resistance as is possible on a flat horizontal back contact post. This problem is particularly important when the front contacts are breaking heavy loads, and thus form an appreciable quantity of carbon dust that may drop down on the back contact.

The new design contacts are not to be considered for carbon to carbon combinations, but are interchangeable with the old low voltage type, silver to silver, it being necessary only to replace the back contact post extension and the contact spring with the new design parts. Front contact posts and carbons, and independent front contact springs are not changed.



APPLICATION OF KNIFE EDGE BACK CONTACTS TO MODEL 12 POLARIZED RELAYS



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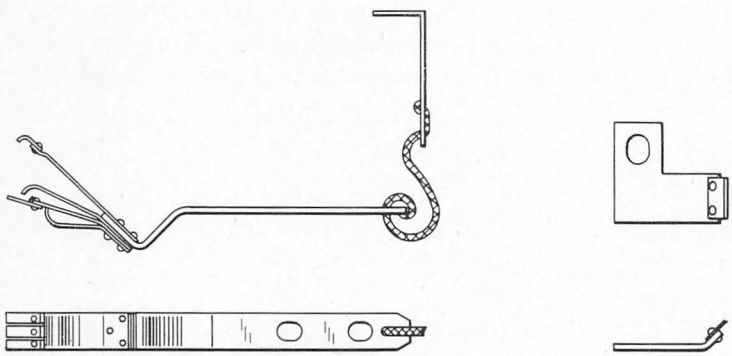


3 5

Knife Edge Back Contacts and Contact Springs

Model 12 Polarized Relay

Detail Parts

Knife Edge Back Contacts and Contact Springs

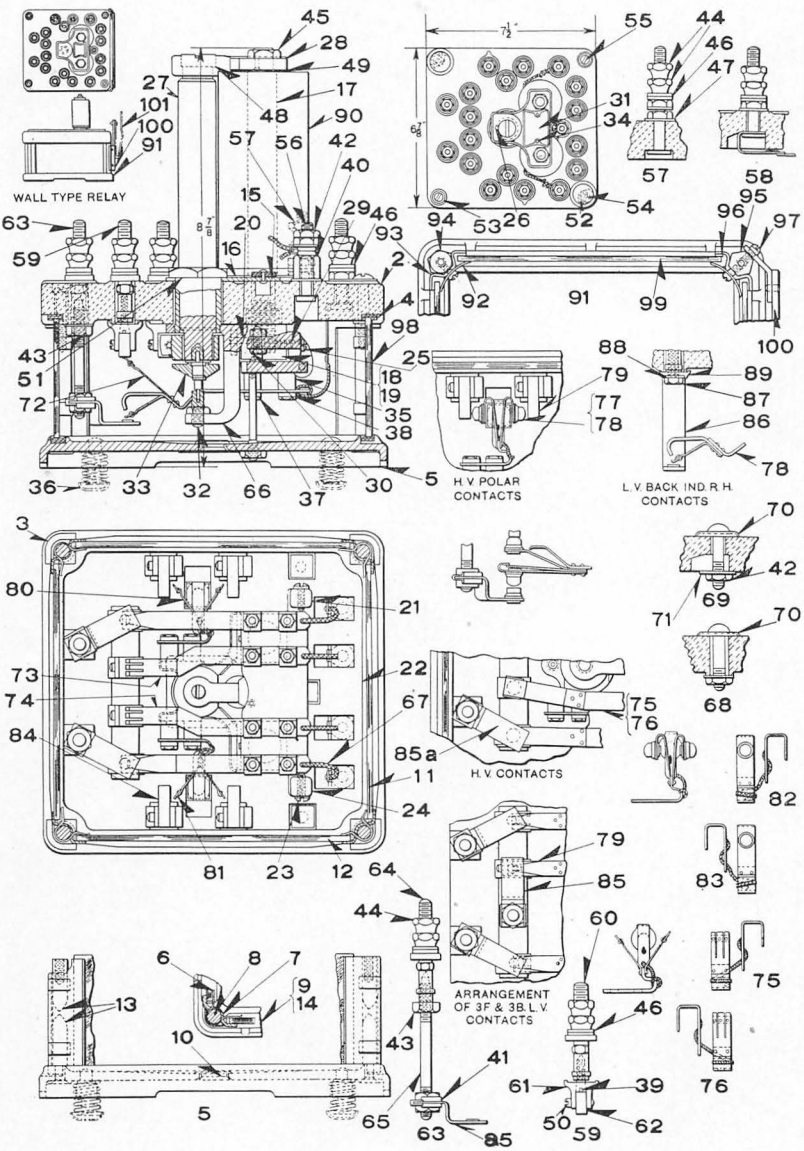
For Model 13 D. C. Neutral Relay Knife Edge Contacts, See Plate E-4834.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
101840	2	**Front and Back Contact Spring Complete** as shown, for Model 12 Polarized Relay having 2N-2R Polar Contacts	8385–2527
101841	3	**Front and Back Contact Spring Complete** as shown, for Model 12 Polarized Relay having 4N-4R Polar Contacts	8385–2528
101838	4	**L.H. Back Contact for Model 12 Polarized Relays** having 2N-2R or 4N-4R Polar Contacts	8094–2364
101839	5	**R.H. Back Contact for Model 12 Polarized Relays** having 2N-2R or 4N-4R Polar Contacts	8094–2364

MEMORANDA

MEMORANDA



Details of the Model 12 Polarized Relay (Two Normal and Two Reverse Polar Contacts)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY

(FOUR FRONT AND TWO BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
72322	**2**	**Top Plate with Gaskets**	C–8141–1
59317	**3**	**Gasket (Corner)** for Ref. 2	8078–1089
49939	**4**	**Gasket** for Ref. 2	8078–771
70482	**5**	**Base Plate with Supports, Posts, Gaskets, Ventilator, Glass Shields and Linings** (Inc. 1-5b, 4-6, 4-7, 4-8, 2-9, 1-10, 2-11, 2-12, 8-13 and 2-14) (For shelf type relays only)	C–8141–2
145291	**5a**	**Base Plate with Supports, Posts, Gaskets, Ventilator, Glass Shields, Linings and Shock Absorber Springs** (Inc. 1-5c, 4-6, 4-7, 4-8, 2-9, 1-10, 2-11, 2-12, 8-13, 2-14 and 4-36) (For shelf type Relays only)	C–8141–10
46175	**5b**	**Base Plate** only for Ref. 5	C–8141–4
145287	**5c**	**Base Plate** only for Ref. 5a	C–8141–10
44224	**6**	**Support**	10932–10
44225	**7**	**Support**	10932–11
51559	**8**	**Post**	8114–298
65640	**9**	**Gasket (For Sides)**	8078–771
34340	**10**	**Ventilator**	C–7459–6
53078	**11**	**Glass Shield (End)**	8163–164
46279	**12**	**Glass Shield (Side)**	8163–107
130381	**13**	**Lining**	10932–52
65641	**14**	**Gasket (For Ends)**	8078–771
72899	**15**	**Core Plate**	C–8141–2
51611	**16**	**Washer**	7828–218

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY (FOUR FRONT AND TWO BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
51617	**17**	**Core**	8101–206
54581	**18**	**Pole Piece L. H.**	8250–44
54582	**19**	**Pole Piece R. H.**	8250–44
3912	**20**	**Core Pin**	8097–8
96903	**21**	**Armature with Bracket and Trunnions** (Inc. 1-22, 2-23 and 1-24)	C–7459–8
70481	**22**	**Armature** only, for Ref. 21	8157–260
47579	**23**	**Trunnion** for Ref. 21	8378–197
49143	**24**	**Armature Bracket** only, for Ref. 21	8303–68
	25	**Machine Screw No. 8-36x1/2″** Fil. Hd. Br. for fastening Ref. 21 to Pole Piece.	
57496	**26**	**Pin** for Ref. 28	8097–872
129986	**27**	**Permanent Magnet**	8101–297
55604	**28**	**Back Strap**	8162–161
49067	**29**	**Dowel Pin** for Ref. 21	8097–336
49141	**30**	**Screw (Core Pin)** with Hex. Nut Ref. 30a	8098–887
26942	**30a**	**Nut** for Ref. 30	8109–184
46289	**31**	**Name Plate**	8225–134
70531	**32**	**Trunnion**	8378–196
70491	**33**	**Armature**	8157–215
	34	**Screw No. 4x3/16″** Hardened Drive (N. P.) for Ref. 31.	
22621	**35**	**Bushing**	8095–199

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
410218	**36**	**Shock Absorber Spring** for Ref. 5a.	
19409	**37**	**Lock Washer** for Ref. 35	8486–68
1515	**38**	**Nut** for Ref. 35	8109–23
30810	**39**	**Screw** for fastening Ref. 61 to Terminal Post	8098–538
56635	**40**	**Nut** for Ref. 56	8109–324
32186	**41**	**Lock Washer** for Ref. 63	8486–129
29103	**42**	**Nut**	8109–194
31670	**43**	**Nut**	8109–218
29101	**44**	**Nut**	8109–193
51610	**45**	**Nut** for Ref. 17	8265–161
29102	**46**	**Washer**	7828–139
29104	**47**	**Washer**	7828–138
55292	**48**	**Screw** for Ref. 27	8190–254
122646	**49**	**Washer**	8078–1366
	50	**Machine Screw No. 6-40x½″** Fil. Hd. Blued Steel for fastening Ref. 62 to Terminal Post.	
55355	**51**	**Washer**	7828–218
37661	**52**	**Anchor Washer** for Ref. 54	7828–168
73493	**53**	**Washer** for Ref. 55	7826–78
59306	**54**	**Screw** for fastening Top Plate to Corner Post	8098–1172
59371	**55**	**Screw** for fastening Top Plate to Corner Post	8098–1172

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	56	**Terminal Post with Nuts, and Washers for Magnet Leads** (Inc. 1-56a, 2-42, 1-46, 1-47 and 1-40).....	12451–121
40066	**56a**	**Terminal Post** only, for Ref. 56.....	8094–797
	57	**Terminal Post with Nuts and Washers for Magnet Leads** (Inc. 1-57a, 2-44, 3-46, 2-42 and 1-47).....	12451
30108	**57a**	**Terminal Post** only, for Ref. 57.....	8094–706
78078	**58**	**Terminal Post with Nuts, and Washers for Terminal Connector** (Inc. 1-58a, 2-44, 2-46, 1-42 and 1-47)...	12451–44
29145	**58a**	**Terminal Post** only, for Ref. 58.....	8094–706
72926	**59**	**Terminal Post with Nuts, Washers, Screws and Graphite Contact Tip** (Inc. 1-60, 1-61, 1-62, 2-44, 2-46, 1-39 and 1-50).....	12451–54
112833	**59a**	**Terminal Post with Nuts, Washers, Screws and Graphite Contact Tip** (Inc. 1-60, 1-61, 1-62a, 2-44, 2-46, 1-39 and 1-50).....	12451–54
113515	**59b**	**Terminal Post with Nuts, Washers, Screws and Graphite Contact Tip** (Inc. 1-60, 1-61, 1-62b, 2-44, 2-46, 1-39 and 1-50).....	12451–54
30812	**60**	**Terminal Post** only for Ref. 59.....	8094–639
30274	**61**	**Terminal Post** only for Ref. 59.....	8094–641
30811	**62**	**Graphite Contact Tip**.....	8341–32
69758	**62a**	**Silver Contact Tip** (Special).....	8341–71

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
91828	**63**	**Terminal Post with Nuts, Washers, Lock Washers, and Back Contact Post** (Inc. 1-64, 1-65, 2-41, 2-42, 2-46, 1-43, 1-47 and 1-83)	12451–20
112832	**63a**	**Terminal Post with Nuts, Washers, Lock Washers, and Back Contact Post** (Inc. 1-64, 1-65, 2-41, 2-42, 2-46, 1-43, 1-47 and 1-83a)	12451–20
30813	**64**	**Terminal Post** only, for Ref. 63	8094–639
46277	**65**	**Terminal Post** only, for Ref. 63	8094–874
46286	**66**	**Armature Bracket, for Polar Contacts**	8303–67
82208	**67**	**Terminal Connector**	10934–162
94436	**68**	**Dummy Post with Nut and Washers for Front of Relay** (Inc. 1-68a, 1-42, 1-47 and 1-70)	12471–3
31067	**68a**	**Dummy Post** only, for Refs. 68 and 69	8098–558
	69	**Dummy Post with Nut and Washer for Back of Relay** (Inc. 1-68a, 1-42, 1-70 and 1-71)	12471
36088	**70**	**Washer** for Ref. 68 and 69	7826–136
2615	**71**	**Washer** for Ref. 69	7828–10

CONTACT SPRINGS

Piece	Ref.	Description	Remarks	Drawing Reference
70488	**72**	**L. V. Front and Back**	Back Contact Tip $\frac{3}{16}$" Wide	8385–1578
87686	**72a**	**H. V. Front and L. V. Back**		8385–1842
68726	**73**	**L. V. Front R. H.**		8385–1576

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Remarks	Drawing Reference
68727	**74**	**L. V. Front L. H.**		8385–1576
70486	**75**	**H. V. Front R. H.**		8385–1580
70487	**76**	**H. V. Front L. H.**		8385–1580
79999	**77**	**H. V. Front and Back**		8385–1579
	78	**L. V. Back**		8385–1722
68725	**79**	**L. V. Front and Back**	Back Contact Tip 3/8" Wide	8385–1721
70484	**80**	**L. V. Polar, R. H.**		8385–1262
70485	**81**	**L. V. Polar, L. H.**		8385–1262
118840	**82**	**H. V. Polar, R. H.**		8385–1925
118841	**83**	**H. V. Polar, L. H.**		8385–1925

Piece	Ref.	Description	Drawing Reference
48829	**84**	**Graphite Contact Tip** only for Polar Contacts.....	8341–283
70483	**84a**	**Silver Contact Tip (Special)** only for Polar Contacts	8341–352
74804	**85**	**Back Contact Post L. V.**.....	8094–2034
76384	**85a**	**Back Contact Post H. V.**.....	8094–2034
	86	**Terminal Post for L. V. Ind. Back with Nut, Screw and Lock Washer** (Inc. 1-86a, 1-87, 1-88, 1-89 and 1-78).....	12451
122871	**86a**	**Terminal Post** only, for Ref. 86.....	8094–1102
38619	**87**	**Screw** for fastening Ref. 86 to Terminal Post.....	8098-736

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY (FOUR FRONT AND TWO BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)

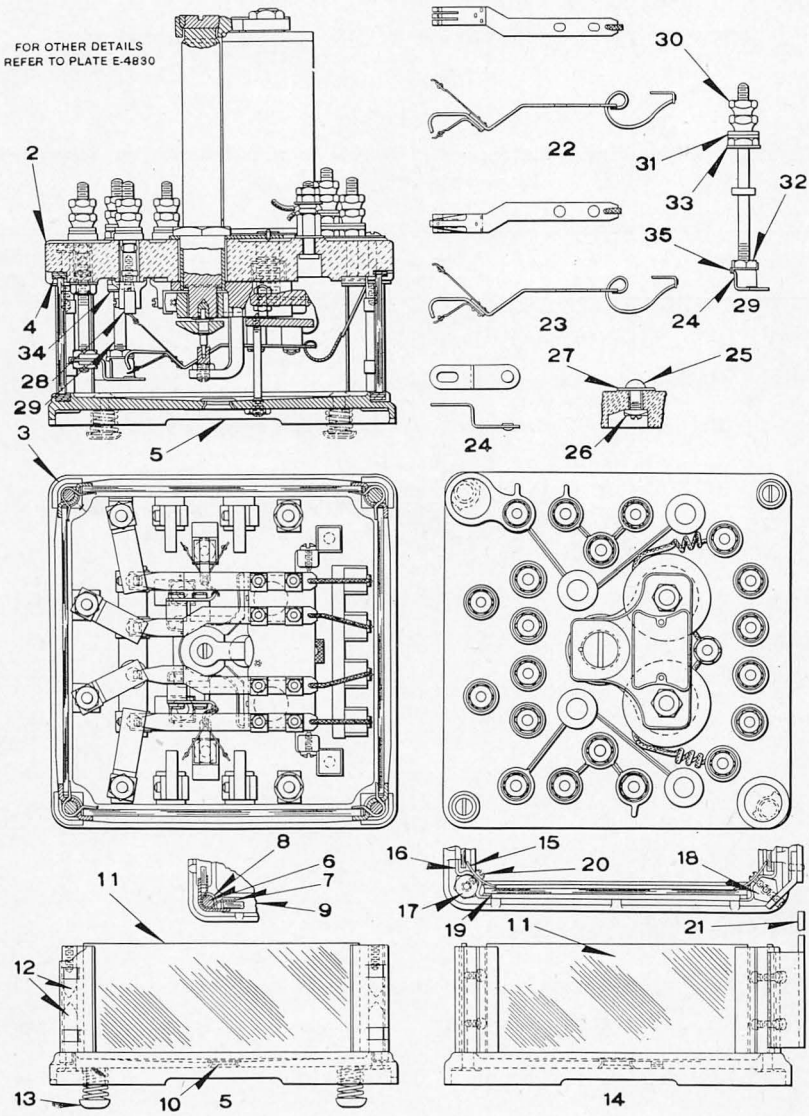
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
29353	**88**	**Lock Washer** for Ref. 86	8486–106
144667	**89**	**Lock Washer** for Ref. 86	8486–378
	90	**Magnet Coil complete with Leads and Terminals** (for details refer to Plate E-5025)	8133
123035	**91**	**Bottom Plate with Supports, Posts, Gaskets, Screws, Glass Shields, Ventilator and Wall Bracket** (Inc. 1-92, 4-93, 4-94, 2-95, 2-96, 8-97, 2-9, 2-14, 12-98, 2-99, 2-100 and 1-10)	C–8141–9
46175	**91a**	**Bottom Plate only,** for Ref. 91	C–8141–2
60606	**92**	**Support**	10932–38
60608	**93**	**Support**	10932–48
60610	**94**	**Post**	8115–148
119778	**95**	**Post**	8115–148
60612	**96**	**Gasket**	8078–807
	97	**Machine Screw No. 8-36x$\frac{5}{16}$″ Fil. Hd. S.**	
60620	**98**	**Glass Shield (End)**	8163–186
60621	**99**	**Glass Shield (Side)**	8163–186
123034	**100**	**Wall Bracket**	C–7459–16
149721	**101**	**Shock Absorber Spring**	12404–20

PLATE E-4826

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 12 POLARIZED RELAY

(FOUR FRONT AND FOUR BACK NEUTRAL AND
TWO NORMAL AND TWO REVERSE POLAR CONTACTS)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY (FOUR FRONT AND FOUR BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
77268	**2**	**Top Plate with Gaskets**	C–8141–4
59317	**3**	**Gasket (Corner)** for Ref. 2	8078–1089
51654	**4**	**Gasket** for Ref. 2	8078–774
121722	**5**	**Base Plate with Posts, Supports, Gaskets, Ventilator, Shields and Linings** (Inc. 1-5b, 4-6, 4-7, 4-8, 4-9, 1-10, 4-11 and 8-12) (For shelf type relays only)	C–8141–5
145307	**5a**	**Base Plate with Posts, Supports, Gaskets, Ventilator, Shields, Linings and Shock Absorber Springs** (Inc. 1-5c, 4-6, 4-7, 4-8, 4-9, 1-10, 4-11, 8-12 and 4-13) (For shelf type relays only)	C–8141–5
57541	**5b**	**Base Plate only,** for Ref. 5	C–8141–4
145290	**5c**	**Base Plate only,** for Ref. 5a	C–8141–10
51559	**6**	**Post**	8114–298
44224	**7**	**Support**	10932–10
44225	**8**	**Support**	10932–11
65642	**9**	**Gasket**	8078–771
34340	**10**	**Ventilator**	C–7459–6
121721	**11**	**Glass Shield (Side and End)**	8163–255
130381	**12**	**Lining**	10932–52
410218	**13**	**Shock Absorber Spring**	
123808	**14**	**Base Plate with Supports, Posts, Gaskets, Screws, Glass Shields, Ventilator and Wall Bracket** (Inc. 1-5b, 4-9, 1-10, 4-11, 4-15, 4-16, 4-17, 4-18, 8-19, 12-20 and 1-21)	C–8141–9
60606	**15**	**Support**	10932–38

PLATE E-4826

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND FOUR BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
60608	**16**	**Support**	10932–48
60610	**17**	**Post**	8115–148
119778	**18**	**Post**	8115–148
60612	**19**	**Gasket**	8078–807
	20	**Machine Screw No. 8-36x$\frac{5}{16}$″ Fil. Hd. S.** (Cad. Pl.)	
121895	**21**	**Wall Bracket**	C–8141–8
79948	**22**	**R. H. Contact Spring (L. V.) Front and Back**	8385–1722
121760	**23**	**L. H. Contact Spring (L. V.) Front and Back**	8385–1737
121768	**24**	**Back Contact Post (Silver Tip ¼″ Diam.) L. V.**	8094–2034
	25	**Dummy Post with Washer and Nut** (Inc. 1-25a, 1-26 and 1-27)	12471
113474	**25a**	**Dummy Post only,** for Ref. 25	8098–1360
38427	**26**	**Nut** for Ref. 25	8109–254
36088	**27**	**Washer** for Ref. 25	7826–136
61690	**28**	**Graphite Contact Tip**	8341–356
	29	**Terminal Post with Nuts, Washers, Lock Washers, and L. V. Back Post** (Inc. 1-24, 1-29a, 2-30, 2-31, 3-32, 1-33, 1-34 and 2-35)	12451
121750	**29a**	**Terminal Post only,** for Ref. 29	8094–1217
29101	**30**	**Nut** for Ref. 29	8109–193
29102	**31**	**Washer** for Ref. 29	7828–139
29103	**32**	**Nut** for Ref. 29	8109–194

UNION SWITCH & SIGNAL COMPANY

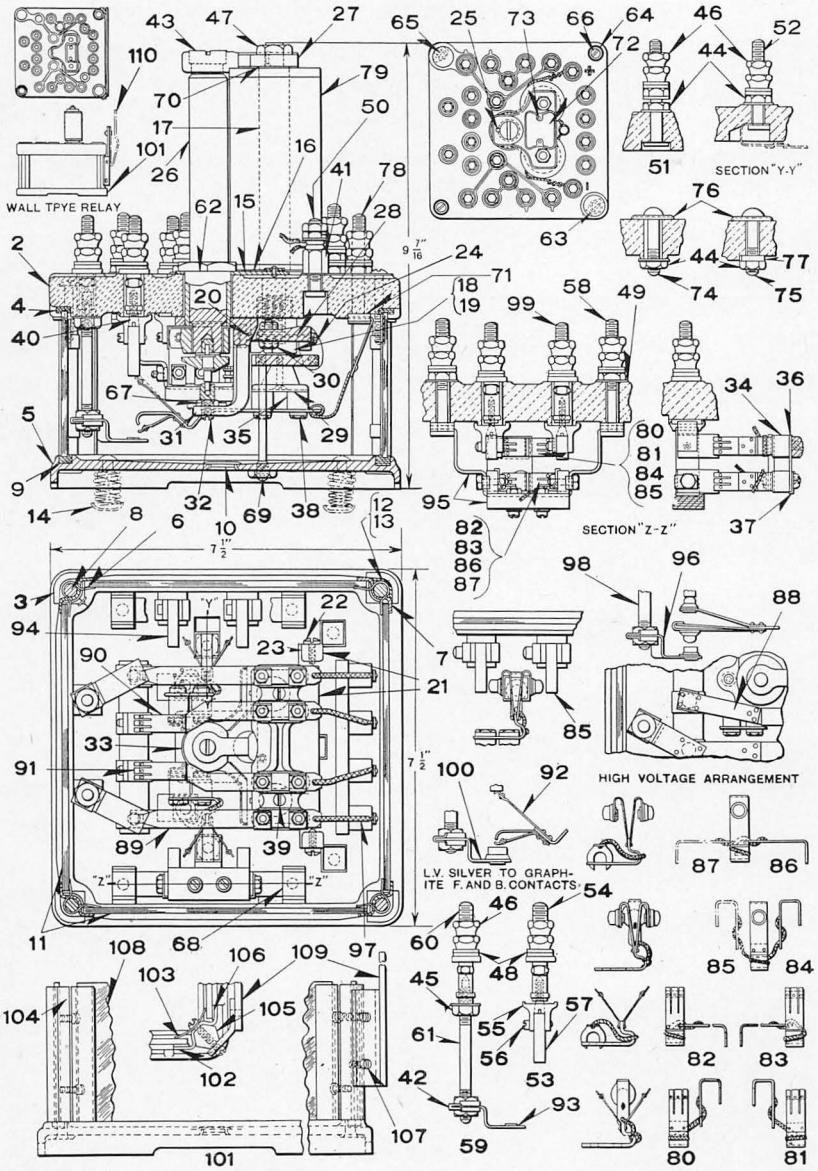
DETAILS OF MODEL 12 POLARIZED RELAY (FOUR FRONT AND FOUR BACK NEUTRAL AND TWO NORMAL AND TWO REVERSE POLAR CONTACTS) (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
29104	**33**	**Washer** for Ref. 29	7828–138
29063	**34**	**Lock Washer** for Ref. 29	8486–111
32186	**35**	**Lock Washer** for Ref. 29	8486–129
		For other Details refer to Plate E-4830.	

PLATE E-4830

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)

For complete Relays Refer to Plate E-4805.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
77268	**2**	**Top Plate with Gaskets**	C–8141–4
59317	**3**	**Gasket (Corner)** for Ref. 2	8078–1089
51654	**4**	**Gasket** for Ref. 2	8078–774
70960	**5**	**Base Plate with Supports, Posts, Gaskets, Ventilator, Glass Shields and Linings** (Inc. 1-5b, 4-6, 4-7, 4-8, 4-9, 1-10, 4-11, 4-12 and 4-13)	C–8141–4
145293	**5a**	**Base Plate with Supports, Posts, Gaskets, Ventilator, Glass Shields, Linings and Shock Absorber Springs** (Inc. 1-5c, 4-6, 4-7, 4-8, 4-9, 1-10, 4-11, 4-12, 4-13 and 4-14)	C–8141–10
57541	**5b**	**Base Plate** only for Ref. 5	C–8141–4
145290	**5c**	**Base Plate** only for Ref. 5a	C–8141–10
58556	**6**	**Support**	10932–10
58557	**7**	**Support**	10932–11
57446	**8**	**Post**	8114–298
65642	**9**	**Gasket**	8078–771
34340	**10**	**Ventilator**	C–7459–6
57442	**11**	**Glass Shield (Side and End)**	8163–164
130381	**12**	**Lining**	10932–52
130800	**13**	**Lining**	10932–52
410218	**14**	**Shock Absorber Spring** for Ref. 5a.	
72899	**15**	**Core Plate**	C–8141–2
51611	**16**	**Washer**	7828–218
51617	**17**	**Core**	8101–206

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
54581	**18**	**Pole Piece L. H.**	8250–44
54582	**19**	**Pole Piece R. H.**	8250–44
3912	**20**	**Core Pin**	8097–8
96902	**21**	**Armature with Bracket and Trunnions** (Inc. 1-21a, 2-22 and 1-23)	C–7459–8
70959	**21a**	**Armature only,** for Ref. 21	8157–246
47579	**22**	**Trunnion** for Ref. 21	8378–197
49143	**23**	**Armature Bracket only,** for Ref. 21	8303–68
	24	**Machine Screw No. 8-36x½″** Fil. Hd. Br. for fastening Ref. 21 to Pole Piece.	
57496	**25**	**Pin** for Ref. 27	8097–872
129986	**26**	**Permanent Magnet**	8101–297
55604	**27**	**Back Strap**	8162–161
49067	**28**	**Dowel Pin** for Ref. 21	8097–336
57440	**29**	**Armature Bar**	8130–281
49141	**30**	**Screw (Core Pin)** with Hex. Nut Ref. 30a	8098–887
26942	**30a**	**Nut** for Ref. 30	8109–184
46286	**31**	**Armature Bracket** for Polar Contacts	8303–67
70531	**32**	**Trunnion** for Ref. 31	8378–196
70491	**33**	**Armature**	8157–215
57578	**34**	**Bushing** for Polar Contacts	8095–520
22621	**35**	**Bushing**	8095–199

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY (FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
57542	**36**	**Spring Support** for Polar Contacts	C–8141–4
19409	**37**	**Lock Washer** for Refs. 34 and 35	8486–68
1515	**38**	**Nut** for Refs. 34 and 35	8109–23
	39	**Machine Screw No. 8-36x¾″** Flat Hd. Br. for fastening Ref. 29 to Armature.	
30810	**40**	**Screw** for fastening Ref. 55 to Ref. 53	8098–538
56635	**41**	**Nut** for Ref. 50	8109–324
32186	**42**	**Lock Washer** for Ref. 61	8486–129
55292	**43**	**Screw** for Ref. 26	8109–254
29103	**44**	**Nut**	8109–194
31670	**45**	**Nut** for Ref. 61	8109–218
29101	**46**	**Nut**	8109–193
51610	**47**	**Nut** for Ref. 17	8265–161
29102	**48**	**Washer**	7828–139
29104	**49**	**Washer**	7828–138
	50	**Terminal Post with Nuts and Washers for Magnet Leads** (Inc. 1-50a, 2-44, 1-41, 1-48 and 1-49)	12451–121
40066	**50a**	**Terminal Post** only, for Ref. 50	8094–797
	51	**Terminal Post with Nuts and Washers for Magnet Leads** (Inc. 1-51a, 2-46, 3-48, 2-44 and 1-49)	12451
30108	**51a**	**Terminal Post** only, for Refs. 51 and 78	8094–706
78078	**52**	**Terminal Post with Nuts and Washers** (Inc. 1-52a, 2-46, 2-48, 1-44 and 1-49)	12451–44

PLATE E-4830

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
29145	**52a**	**Terminal Post** only, for Ref. 52	8094–706
96054	**53**	**Terminal Post, with Nuts, Washers, Screws and Graphite Contact Tip** (Inc. 1-54, 2-46, 2-48, 1-40, 1-55, 1-56 and 1-57)	12451–54
30812	**54**	**Terminal Post** only, for Refs. 53 and 99	8094–639
30274	**55**	**Terminal Post** only, for Refs. 53 and 99	8094–641
	56	**Machine Screw No. 6-40x½″** Fil. Hd. Blued Steel for fastening Ref. 57 to Ref. 55.	
57272	**57**	**Graphite Contact Tip**	8341–351
110148	**58**	**Terminal Post with Nuts, Washers and Lock Washer** (Inc. 1-58a, 2-46, 2-48, 1-44, 1-49 and 1-68)	12451–36
31668	**58a**	**Terminal Post** only, for Ref. 58	8094–706
114955	**59**	**Terminal Post with Nuts, Washers, Lock Washers and L. V. Back Post** (Inc. 1-60, 1-61, 2-46, 2-48, 1-49, 1-45, 2-42, 2-44 and 1-93)	12451–20
	59a	**Terminal Post with Nuts, Washers, Lock Washers, and H. V. Back Post** (Inc. 1-60, 1-61a, 2-46, 2-48, 1-49, 1-45, 2-42, 2-44 and 1-93a)	12451–20
30813	**60**	**Terminal Post** only, for Ref. 59	8094–639
34128	**61**	**Terminal Post** only for L. V. for Ref. 59	8094–730
32405	**61a**	**Terminal Post** only for H. V. for Ref. 98	8094–729
55355	**62**	**Washer**	7828–213
37661	**63**	**Anchor Washer** for Ref. 65	7828–168
73493	**64**	**Washer** for Ref. 66	7826–78
59306	**65**	**Screw** for fastening Top Plate to Corner Post	8098–1172

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY (FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS) (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
59371	**66**	**Screw** for fastening Top Plate to Corner Post	8098–1173
1508	**67**	**Nut** for Ref. 32	8109–14
29063	**68**	**Lock Washer** for Refs. 58 and 78	8486–111
	69	**Screw with Nut** (Inc. 1-69a and 1-44) used in shipping	12471
57584	**69a**	**Screw** only, for Ref. 69	8098–951
121374	**69b**	**Screw** used in place of Ref. 69 when installed	8098–1289
122646	**70**	**Washer**	8078–1366
132658	**71**	**Lock Washer** for Ref. 78	8486–369
46289	**72**	**Name Plate**	8225–134
	73	**Drive Screw No. 4x$\frac{3}{16}$"** Hardened (N. P.) for fastening Ref. 72 to Back Strap.	
94436	**74**	**Dummy Post with Nut and Washers for Front of Relay** (Inc. 1-74a, 1-76, 1-44 and 1-49)	12471–3
31067	**74a**	**Dummy Post** only, for Refs. 74 and 75	8098–558
98875	**75**	**Dummy Post with Nut and Washers for Back of Relay** (Inc. 1-74a, 1-76, 1-44 and 1-77)	12471–11
36088	**76**	**Washer** for Refs. 74 and 75	7826–136
31068	**77**	**Washer** for Ref. 75	7828–144
	78	**Terminal Post with Nuts, Washers and Lock Washer for Terminal Connector** (Inc. 1-51a, 2-46, 2-48, 1-44, 1-49 and 1-68)	12451
	79	**Magnet Coil complete with Leads and Terminals** (for details refer to Plate E-5025)	8133

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Contact Springs				
Piece	Ref.	Description	Remarks	Drawing Reference
70961	**80**	**L. V. Polar (Upper Deck) R. H.**		8385–1262
70962	**81**	**L. V. Polar (Upper Deck) L. H.**		8385–1262
70963	**82**	**L. V. Polar (Lower Deck) R. H.**		8385–1477
70964	**83**	**L. V. Polar (Lower Deck) L. H.**		8385–1477
118840	**84**	**H. V. Polar (Upper Deck) R. H.**		8385–1925
118841	**85**	**H. V. Polar (Upper Deck) L. H.**		8385–1925
118844	**86**	**H. V. Polar (Lower Deck) R. H.**		8385–1926
118843	**87**	**H. V. Polar (Lower Deck) L. H.**		8385–1926
80165	**88**	**H. V. Front L. H.**		8385–1821
80164	**88a**	**H. V. Front R. H.**		8385–1821
70969	**89**	**L. V. Front and Back**	Back Contact Tip $\frac{3}{16}$″ Wide	8385–1317
97358	**89a**	**H. V. Front and L. V. Back**		8385–1863
70968	**90**	**L. V. Front R. H.**		8385–1315
70967	**91**	**L. V. Front L. H.**		8385–1315
137377	**92**	**L. V. Front and Back**	Back Contact Tip $\frac{3}{8}$″ Wide	8385–2029

Piece	Ref.	Description	Drawing Reference
74804	**93**	**Back Contact Post (Silver Tip ¼″ Diam.) L. V.**	8094–2034

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
76384	**93a**	**Back Contact Post** (**Silver Tip 3/8″ Diam.**) **L. V.**	8094–2034
81690	**94**	**Graphite Contact Tip** only for Polar Contacts	8341–356
70861	**94a**	**Silver Contact Tip** (**Special**) only for Polar Contacts	8341–457
71114	**95**	**Terminal Post with Contact Tips** (**Graphite**) **for Lower Deck Polar Contacts**	8094–1219
70965	**95a**	**Terminal Post with Contact Tips** (**Silver**) (**Special**) **for Lower Deck Polar Contacts**	8094–1219
80916	**96**	**Back Contact Post** (**Graphite Tip**) **H. V.**	8094–2034
82208	**97**	**Terminal Connector**	10934–164
	98	**Terminal Post, with Nuts, Washers, Lock Washers and H. V. Back Contact** (Inc. 1-60, 1-61a, 2-46, 2-48 1-49, 1-45, 2-42, 2-44 and 1-96)	12451
	99	**Terminal Post with Nuts, Washers, Screws and Contact Tip for Polar Contacts** (Inc. 1-54, 1-55, 1-40, 1-56, 2-46, 2-48 and 1-94)	12451
127232	**100**	**Back Contact Post** (Used for Silver to Graphite Front and Back Contact)	8094–1257
121896	**101**	**Bottom Plate with Supports, Posts, Gaskets, Screws, Glass Shields, Ventilator, and Wall Bracket** (Inc. 1-5b, 4-102, 4-103, 2-104, 2-105, 8-106, 12-107, 4-108, 1-109, 1-9 and 1-10)	C–8141–8
60609	**102**	**Support**	10932–48
60607	**103**	**Support**	10932–38

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 12 POLARIZED RELAY
(FOUR FRONT AND TWO BACK NEUTRAL AND FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)
(Continued)

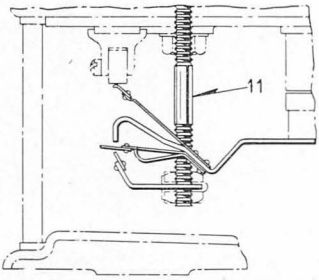
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
60611	**104**	**Post**	8115–148
121894	**105**	**Post**	8115–151
60613	**106**	**Gasket**	8078–807
	107	**Machine Screw No. 8-36x$\frac{5}{16}$″ Fil. Hd. Br.**	
60623	**108**	**Glass Shields (Side and End)**	8163–186
121895	**109**	**Wall Bracket**	C–8141–8
149721	**110**	**Shock Absorber Spring**	12404–20

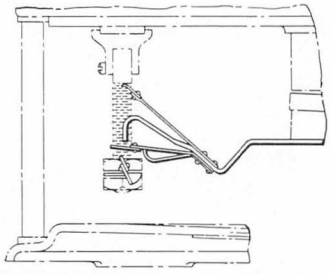
Improved Design Back Contacts for Model 13 Neutral Relays

Knife-edge type back contacts similar to the types that have proven so successful on Style DN-11 and other modern Union relays are now available for these older design relays. The advantage of this type of contact design is that foreign material or carbon dust from the front contact cannot collect on the back contact post and tend to introduce high contact resistance as is possible on a flat horizontal back contact post. This problem is particularly important when the front contacts are breaking heavy loads, and thus form an appreciable quantity of carbon dust that may drop down on the back contact.

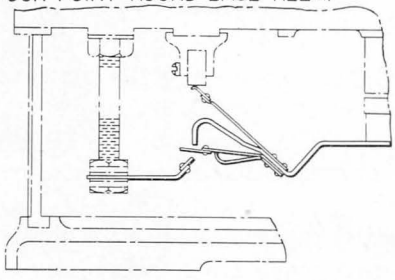
The new design contacts are not to be considered for carbon to carbon combinations, but are interchangeable with the old type silver to silver or silver to carbon, it being necessary only to replace the back contact post extension (also the back post for 4-Point round base relays) and the contact spring with the new design parts. Front contact posts and carbons, and independent front contact springs are not changed.



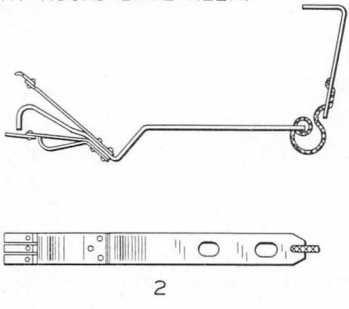
APPLICATION OF KNIFE EDGE BACK CONTACTS TO MODEL 13 FOUR POINT ROUND BASE RELAY

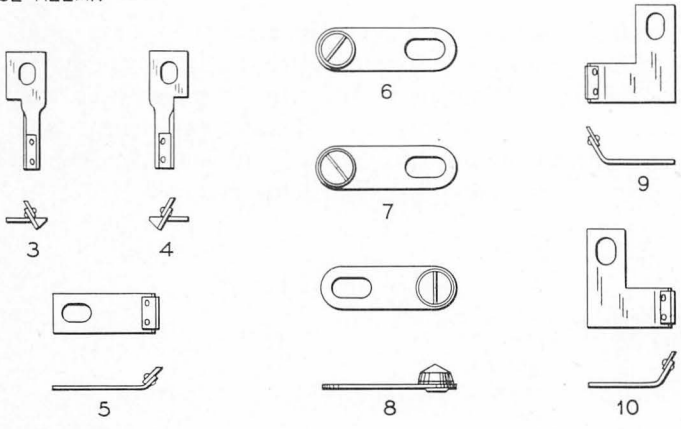


APPLICATION OF KNIFE EDGE BACK CONTACTS TO MODEL 13 TWO POINT ROUND BASE RELAY



APPLICATION OF KNIFE EDGE BACK CONTACTS TO MODEL 13 SQUARE BASE RELAY.





Knife Edge Back Contacts and Contact Spring

Model 13 Relay

Detail Parts

Knife Edge Back Contacts and Contact Spring

For Model 12 Polarized Relay Knife Edge Contacts, See Plate E-4824.

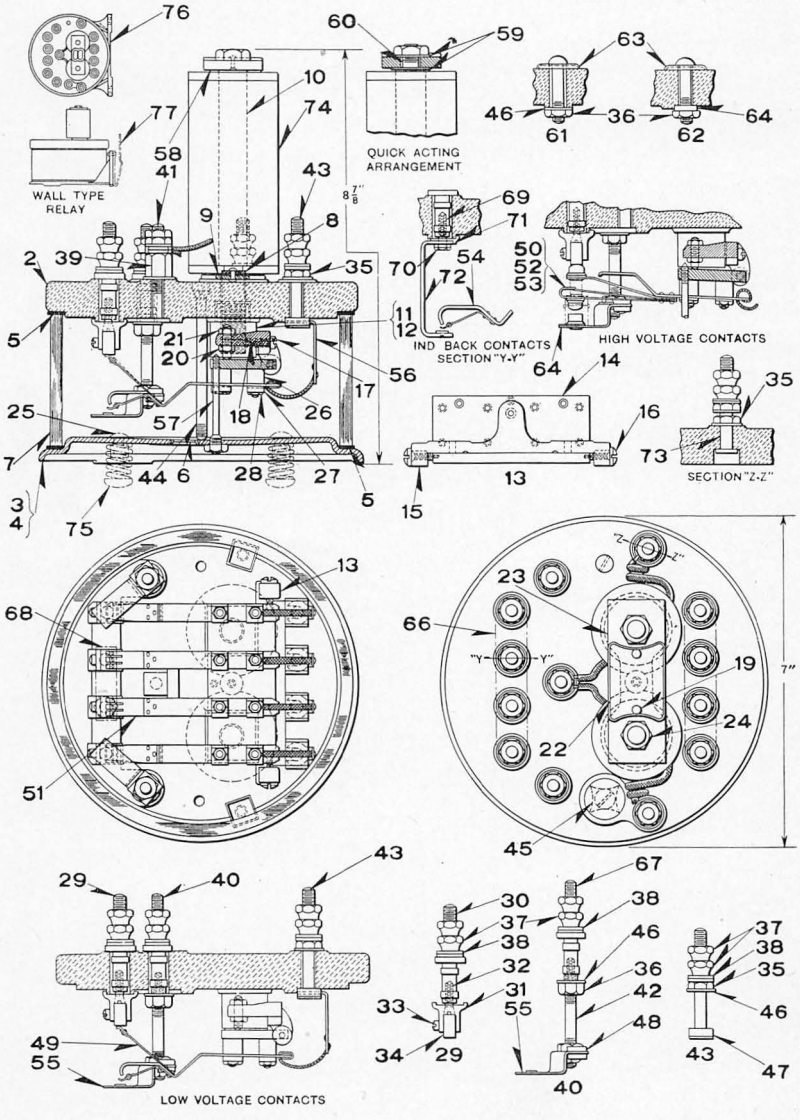
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
198822	**2**	**Front and Back Contact Spring Complete** as shown (For all types of Model 13 Relays)	8385–2490
194751	**3**	**L.H. Back Contact (Silver) for Model 13 Round Base 2-Point Relay**	8094–1108
194752	**4**	**R.H. Back Contact (Silver) for Model 13 Round Base 2-Point Relay**	8094–1108
194744	**5**	**Back Contact (Silver) for Model 13 Square Base 4, 6, 8 and 10-Point Relays**	8094–1106
108278	**6**	**Back Contact (Silver Imp. Carbon) for Model 13 Round Base 4-Point Relay**	8094–2405
108279	**7**	**Back Contact (Silver Imp. Carbon) for Model 13 Round Base 4-Point Relay**	8094–2405
108277	**8**	**Back Contact (Silver Imp. Carbon) for Model 13 Square Base 4, 6, 8 and 10-Point Relays**	8094–2404
194747	**9**	**L.H. Back Contact (Silver) for Model 13 Round Base 4-Point Relay**	8094–1107
194748	**10**	**R.H. Back Contact (Silver) for Model 13 Round Base 4-Point Relay**	8094–1107
30840	**11**	**Terminal Post for Model 13 Round Base 4-Point Relay** (To replace existing terminal post when adding knife edge back contact to 4-Point Relay only)	8094–638

MEMORANDA

PLATE E-4835

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY

(FOUR-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY

(FOUR-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
74745	**2**	**Top Plate with Gasket** Ref. 5	C–7459–11
76002	**3**	**Bottom Plate with Gasket and Ventilator** (Inc. 1-4, 1-5 and 1-6)	10937–1
145361	**3a**	**Bottom Plate with Gasket, Ventilator, Studs and Shock Absorber Springs** (Inc. 1-4a, 1-5, 1-6, 4-25 and 4-15)	10937–5
46517	**4**	**Bottom Plate** only, for Ref. 3	10937–1
145360	**4a**	**Bottom Plate** only, for Ref. 3a	10937–5
33872	**5**	**Gasket**	8078–76
34340	**6**	**Ventilator**	C–7459–6
35872	**7**	**Glass Shield**	8163–96
75337	**8**	**Core Plate**	C–7459–10
51611	**9**	**Washer** used under Magnet Coil	7828–218
51617	**10**	**Core**	8101–206
51618	**11**	**L. H. Pole Piece**	8250–44
51619	**12**	**R. H. Pole Piece**	8250–44
96900	**13**	**Armature with Bracket and Trunnions** (Inc. 1-14, 1-15 and 2-16)	C–7459–8
69754	**14**	**Armature only,** for Ref. 13	8157–226
49143	**15**	**Bracket only,** for Ref. 13	8303–68
47579	**16**	**Trunnion** for Ref. 13	8378–197
	17	**Machine Screw No. 8-36x½″** Fil. Hd. Br. for fastening Ref. 15 to Pole Piece.	
49067	**18**	**Dowel Pin** for Armature Bracket	8097–336

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (FOUR-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	19	**Drive Screw No. 4x$\frac{3}{16}$″** (N. P.) for fastening Ref. 22 to Back Strap.	
	20	**Screw (Core Pin)** with Nut Ref. 21	12471
49141	**20a**	**Screw (Core Pin)** only for Ref. 20	8098–887
26942	**21**	**Nut** for Ref. 20	8109–184
46539	**22**	**Name Plate**	8225–135
46450	**23**	**Back Strap** only	8162–146
51610	**24**	**Nut** for Ref. 10	8265–161
131215	**25**	**Stud** for Ref. 3a	8114–631
22621	**26**	**Bushing**	8095–199
19409	**27**	**Lock Washer** for Ref. 28	8486–68
1515	**28**	**Nut,** for Ref. 26	8109–23
	29	**Front Terminal Post with Graphite Tip and Screw** (Inc. 1-30, 1-31, 1-32, 1-33, 1-34, 2-37 and 2-38)	12451
30812	**30**	**Terminal Post** only for Ref. 29	8094–639
30274	**31**	**Terminal Post** only for Ref. 29	8094–641
30810	**32**	**Screw** for fastening Ref. 31 to Ref. 30	8098–538
	33	**Machine Screw No. 6-40x½″** Fil. Hd. Blued Steel for fastening Graphite Tip to Ref. 31.	
30811	**34**	**Graphite Contact Tip**	8341–32
69758	**34a**	**Silver Contact Tip (Special)**	8341–71

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (FOUR-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
29103	**35**	**Nut**	8109–194
31670	**36**	**Nut** for Ref. 40	8109–218
29101	**37**	**Nut**	8109–193
29102	**38**	**Washer**	7828–139
56635	**39**	**Nut** for Ref. 41	8109–324
91828	**40**	**Terminal Post with Nuts, Washers and Back Contact** (Inc. 1-67, 1-42, 2-35, 1-36, 1-48, 2-37, 2-38 and 1-55)	12451–20
112832	**40a**	**Terminal Post with Nuts, Washers and Back Contact** (Inc. 1-67, 1-42, 2-35, 1-36, 1-48, 2-37, 2-38 and 1-65)	12451–20
	41	**Terminal Post with Nuts and Washer for Magnet Lead** (Inc. 1-41a, 2-35, 1-38, 1-39 and 1-46)	12451–121
29147	**41a**	**Terminal Post** only, for Refs. 41 and 73	8094–706
46277	**42**	**Terminal Post** only, for Ref. 40	8094–874
	43	**Terminal Post with Nuts, Washers and Lock Washer for Terminal Connector** (Inc. 1-43a, 2-37, 2-38, 1-35 1-47 and 1-46)	12451
30108	**43a**	**Terminal Post** only, for Ref. 43	8094–706
35873	**44**	**Screw** for fastening **Bottom Plate** to Ref. 2	8098–572
37761	**45**	**Anchor Washer** for Ref. 44	7828–168
29104	**46**	**Washer**	7828–138
132658	**47**	**Lock Washer,** for Ref. 43	8486–369
32186	**48**	**Lock Washer,** for Ref. 40	8486–129

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (FOUR-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Contact Springs				
Piece	Ref.	Description	Remarks	Drawing Reference
69755	**49**	**L. V. Front and Back**		8385–1320
76198	**49a**	**H. V. Front and L. V. Back**		8385–1336
69759	**50**	**H. V. Front and Back**		8385–1334
69756	**51**	**L. V. Front**		8385–1321
76280	**52**	**H. V. Front**		8385–1338
82292	**53**	**H. V. Back**		8385–1652
86140	**54**	**L. V. Back**		8385–1320

Piece	Ref.	Description	Drawing Reference
74804	**55**	**Back Contact Post** (**L. V.**) for Ref. 40	8094–2034
97875	**56**	**Terminal Connector**	10934–162
	57	**Screw with nut** (Inc. 1-57a, and 1-35 used for shipping)	12471
51615	**57a**	**Screw** only, for Ref. 57	8098–951
121374	**57b**	**Screw** (Used in place of Ref. 57 when installed)	8098–1289
122646	**58**	**Washer**	8078–1366
25153	**59**	**Washer** (Used for quick acting Relay)	7828–127
25107	**60**	**Bushing** (Used for quick-acting Relay)	C–7459–2
94436	**61**	**Dummy Post,** with Nuts and Washers for front of Relay (Inc. 1-61a, 1-35, 1-46 and 1-63)	12471–3
31067	**61a**	**Dummy Post** only, for Refs. 61 and 62	8098–558

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (FOUR-POINT)

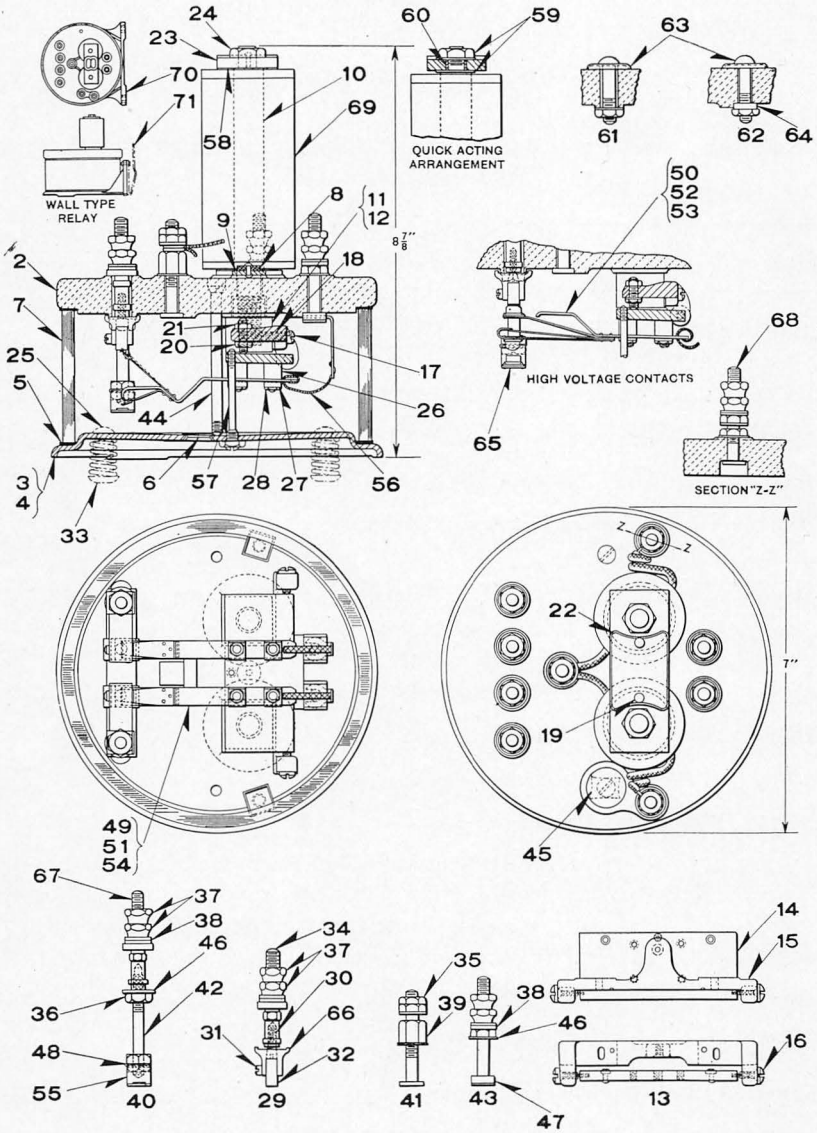
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
98875	**62**	**Dummy Post,** with Nuts and Washers for back of Relay (Inc. 1-61a, 1-35, 1-63 and 1-64)	12471–11
36088	**63**	**Washer,** for Refs. 61 and 62	7826–136
31068	**64**	**Washer,** for Ref. 62	7828–144
76384	**65**	**Back Contact Post (H. V.)**	8094–2034
47290	**66**	**Terminal Connector** (For connecting contacts in multiple)	8064–305
30813	**67**	**Terminal Post** only, for Ref. 40	8094–639
69757	**68**	**Back Contact Post,** (Silver Tip) (Used on Relays having three front and three back contacts)	8094–874
38619	**69**	**Screw** for fastening Ref. 72, to Terminal Post	8098–736
29353	**70**	**Lock Washer** for Ref. 69	8486–103
62686	**71**	**Lock Washer** for Ref. 72	8486–335
122781	**72**	**Back Post** only	8094–1102
	73	**Terminal Post with Nuts and Washers for Magnet Lead** (Inc. 1-41a, 2-37, 3-38, 2-35 and 1-46)	12451
	74	**Magnet Coil complete with Leads and Terminals** (for details refer to Plate E-5025)	8133
410218	**75**	**Shock Absorber Spring** for Shelf Type Relay.	
114929	**76**	**Base with Gasket and Ventilator** for Wall Type Relay (Inc. 1-76a, 1-5 and 1-6)	C–7459–15
114877	**76a**	**Base** only for Ref. 76	C–7459–15
149677	**77**	**Shock Absorber Spring** for Wall Type Relay	12404–19

PLATE E-4836

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY
(TWO-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY

(TWO-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
76089	**2**	**Top Plate with Gasket** Ref. 5	C–7459–11
76002	**3**	**Bottom Plate with Gasket and Ventilator** (Inc. 1-4, 1-5 and 1-6)	10937–1
145361	**3a**	**Bottom Plate with Gasket, Ventilator, Studs and Shock Absorber Springs** (Inc. 1-4a, 1-5, 1-6, 4-25 and 4-33)	10937–5
46517	**4**	**Bottom Plate** only, for Ref. 3	10937–1
145360	**4a**	**Bottom Plate** only, for Ref. 3a	10937–5
33872	**5**	**Gasket**	8078–76
34340	**6**	**Ventilator**	C–7459–6
35872	**7**	**Glass Shield**	8163–96
75337	**8**	**Core Plate**	C–7459–10
51611	**9**	**Washer** used under Magnet Coil	7828–218
51617	**10**	**Core**	8101–206
51618	**11**	**L. H. Pole Piece**	8250–44
51619	**12**	**R. H. Pole Piece**	8250–44
96901	**13**	**Armature with Bracket and Trunnions** (Inc. 1-14, 1-15 and 2-16)	C–7459–8
69762	**14**	**Armature only**, for Ref. 13	8157–228
49143	**15**	**Bracket only**, for Ref. 13	8303–68
47579	**16**	**Trunnion** for Ref. 13	8378–197
	17	**Machine Screw No. 8-36x1/2″** Fil. Hd. Br. for fastening Ref. 15 to Pole Piece.	

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (TWO-POINT) (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
49067	**18**	**Dowel Pin** for Armature Bracket	8097–336
	19	**Drive Screw No. 4x$\frac{3}{16}$″** (N. P.) for fastening Ref. 22 to Back Strap.	
	20	**Screw (Core Pin)** with Nut Ref. 21	12471
49141	**20a**	**Screw (Core Pin)** only for Ref. 20	8098–887
26942	**21**	**Nut** for Ref. 20	8109–184
46539	**22**	**Name Plate**	8225–135
46540	**23**	**Back Strap** only	8162–146
51610	**24**	**Nut** for Ref. 10	8265–161
131215	**25**	**Stud** for Ref. 3a	8114–631
22621	**26**	**Bushing**	8095–199
19409	**27**	**Lock Washer** for Ref. 26	8486–68
1515	**28**	**Nut** for Ref. 26	8109–23
72926	**29**	**Terminal Post with Graphite Tip, Screw, Nuts and Washers** (Inc. 1-66, 1-30, 1-31, 1-32, 2-37, 2-38 and 1-34)	12451–54
30810	**30**	**Screw** for fastening Ref. 29 to Ref. 67	8098–538
	31	**Machine Screw No. 6-40x½″** Fil. Hd. Blued Steel for fastening Graphite Tip Ref. 32 to Ref. 29.	
30811	**32**	**Graphite Front Contact Tip**	8341–32
69758	**32a**	**Silver Front Contact Tip (Special)**	8341–71
410218	**33**	**Shock Absorber Spring** for Shelf Type Relays.	

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (TWO-POINT) (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
30812	**34**	**Terminal Post** only for Ref. 29	8094–639
29103	**35**	**Nut**	8109–194
31670	**36**	**Nut** for Ref. 40	8109–218
29101	**37**	**Nut**	8109–193
29102	**38**	**Washer**	7828–139
56635	**39**	**Nut** for Ref. 41	8109–324
91828	**40**	**Terminal Post with Nuts, Washers and Back Contact** (Inc. 1-67, 1-42, 2-35, 1-36, 1-46, 1-48, 2-37, 2-38 and 1-55)	12451–20
112832	**40a**	**Terminal Post with Nuts, Washers and Back Contact** (Inc. 1-67, 1-42, 2-35, 1-36, 1-46, 1-48, 2-37, 2-38 and 1-65)	12451–20
	41	**Terminal Post with Nuts and Washers** (Inc. 1-41a, 2-35, 1-39 and 1-46)	12451–121
29147	**41a**	**Terminal Post** only, for Ref. 41	8094–706
46277	**42**	**Terminal Post** only, for Ref. 40	8094–874
	43	**Terminal Post with Nuts, Washers and Lock Washers** (Inc. 1-43a, 2-37, 2-38, 1-35, 1-47 and 1-46)	12451
30108	**43a**	**Terminal Post** only, for Ref. 43	8094–706
35873	**44**	**Screw** for fastening Bottom Plate to Ref. 2	8098–572
37761	**45**	**Anchor Washer** for Ref. 44	7828–168
29104	**46**	**Washer**	7828–138
132658	**47**	**Lock Washer,** for Ref. 43	8486–369
32186	**48**	**Lock Washer,** for Ref. 40	8486–129

PLATE E-4836

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (TWO-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Contact Springs				
Piece	Ref.	Description	Remarks	Drawing Reference
69755	**49**	**L. V. Front and Back**		8385–1320
69759	**50**	**H. V. Front and Back**		8385–1334
69756	**51**	**L. V. Front**		8385–1321
76280	**52**	**H. V. Front**		8385–1338
82292	**53**	**H. V. Back**		8385–1652
86140	**54**	**L. V. Back**		8385–1320

Piece	Ref.	Description	Drawing Reference
74804	**55**	**Back Contact Post** (**L. V.**) for Ref. 40	8094–2034
97875	**56**	**Terminal Connector**	10934–162
	57	**Screw with Nut** (Inc. 1-57a and 1-35 used for shipping)	12471
51615	**57a**	**Screw only,** for Ref. 57	8098–951
121374	**57b**	**Screw** (Used in place of Ref. 57 when installed)	8098–1289
122646	**58**	**Washer**	8078–1366
25153	**59**	**Washer** (Used for quick acting Relay)	7828–127
25107	**60**	**Bushing** (Used for quick acting Relay	C–7459–2
94436	**61**	**Dummy Post,** with Nuts and Washers for front of Relay (Inc. 1-61a, 1-35, 1-46 and 1-63)	12471–3
31067	**61a**	**Dummy Post** only, for Ref. 61 and 62	8098–558
98875	**62**	**Dummy Post,** with Nuts and Washers for back of Relay (Inc. 1-61a, 1-35, 1-63 and 1-64)	12471–11

UNION SWITCH & SIGNAL COMPANY

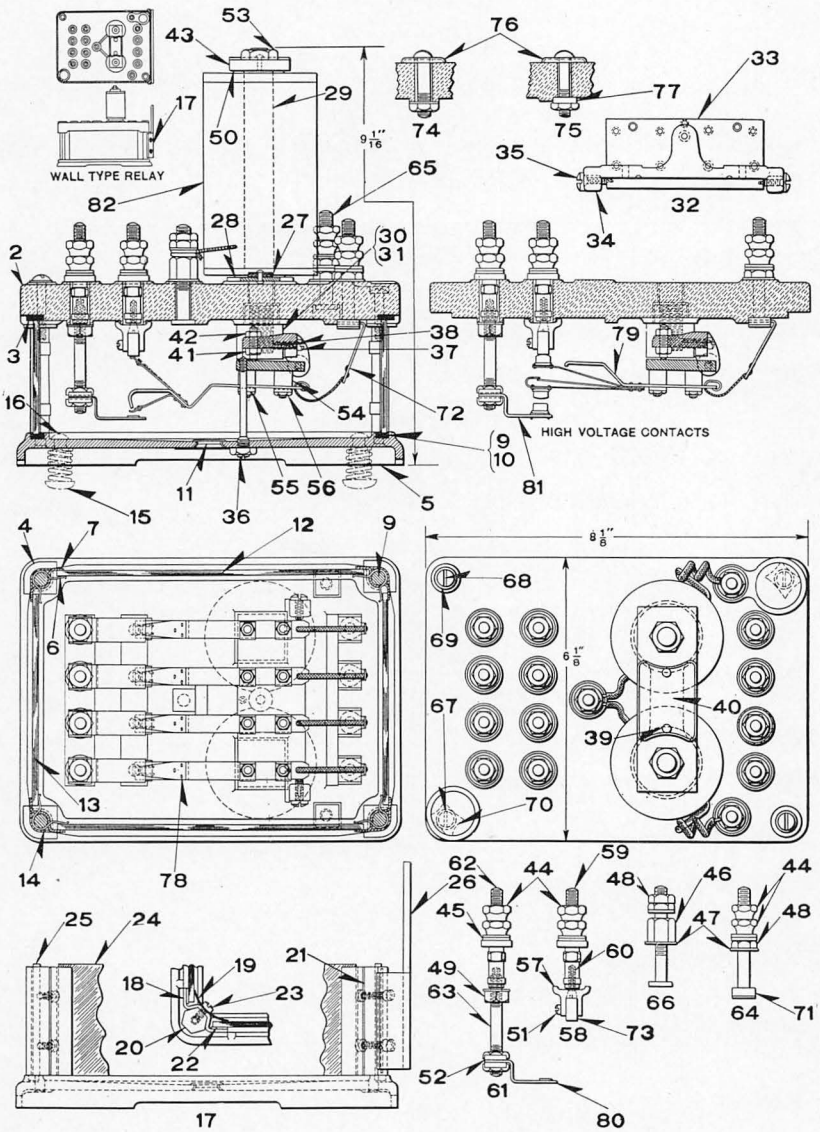
DETAILS OF MODEL 13 ROUND BASE NEUTRAL RELAY (TWO-POINT) (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
36088	**63**	**Washer,** for Refs. 61 and 62	7826–136
31068	**64**	**Washer,** for Ref. 62	7828–144
76384	**65**	**Back Contact Post** only (H. V.)	8094–2034
30274	**66**	**Terminal Post** only for Ref. 29	8094–641
30813	**67**	**Terminal Post** only for Ref. 40	8094–639
	68	**Terminal Post with Nuts and Washers** (Inc. 1-41a, 2-37, 3-38, 2-35 and 1-46)	12541
	69	**Magnet Coil complete with Leads and Terminals** (for details refer to Plate E-5025)	8133
114929	**70**	**Base with Gasket and Ventilator** for Wall Type Relays (Inc. 1-70a, 1-5 and 1-6)	C–7459–15
114877	**70a**	**Base** only for Ref. 70	C–7459–15
149677	**71**	**Shock Absorber Spring** for Wall Type Relays	12404–19

PLATE E-4838

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 13 NEUTRAL RELAY
SQUARE BASE (FOUR-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

SQUARE BASE (FOUR-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
76514	**2**	**Top Plate with Gaskets**	C–7459–13
51655	**3**	**Gasket** for Ref. 2	8078–775
59317	**4**	**Gasket** for Ref. 2	8078–1089
71417	**5**	**Bottom Plate with Supports, Posts, Gaskets, Ventilator, Glass Shields, and Corner Linings** (Inc. 1-5a, 4-6, 4-7, 4-8, 2-9, 2-10, 1-11, 2-12, 2-13 and 8-14)	C–7459–9
51667	**5a**	**Bottom Plate, only** for Refs. 5 and 17	C–7459–9
145300	**5b**	**Bottom Plate with Supports, Posts, Gaskets, Ventilator, Glass Shields, Corner Linings and Shock Absorber Springs** (Inc. 1-5c, 4-6, 4-7, 4-8, 2-9, 2-11, 1-11, 2-12, 2-13, 8-14, 4-15 and 4-16)	C–7459–18
145299	**5c**	**Bottom Plate only,** for Ref. 5b	C–7459–18
44224	**6**	**Support**	10932–10
44225	**7**	**Support**	10932–11
51559	**8**	**Post**	8114–298
37394	**9**	**Gasket**	8078–559
37396	**10**	**Gasket**	8078–559
34340	**11**	**Ventilator**	C–7459–6
51561	**12**	**Glass Shield (Side)**	8163–107
51628	**13**	**Glass Shield (End)**	8163–164
130381	**14**	**Corner Lining**	10932–52
410218	**15**	**Shock Absorber Spring** for Ref. 5b.	
145116	**16**	**Stud** for Ref. 5b	8114–631

PLATE E-4838

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
SQUARE BASE (FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
119756	**17**	**Bottom Plate with Supports, Posts, Gaskets, Screws, Glass Shields, Ventilator and Wall Bracket** (Inc. 1-5a, 4-18, 4-19, 2-20, 2-21, 8-22, 2-9, 2-10, 12-23, 2-24, 2-25, 1-11 and 1-26)	C–7459–16
60608	**18**	**Support**	10932–48
60606	**19**	**Support**	10932–38
60610	**20**	**Post**	8115–148
119778	**21**	**Post**	8115–148
60612	**22**	**Gasket**	8078–807
	23	**Machine Screw No. 8-36x$\frac{5}{16}$″ Fil. Hd. S.** (Cad. Pl.)	
60616	**24**	**Glass Shield (Side)**	8163–186
60618	**25**	**Glass Shield (End)**	8163–186
122093	**26**	**Wall Bracket**	C–7459–16
76071	**27**	**Core Plate**	C–7459–9
51611	**28**	**Washer**	7828–218
51617	**29**	**Core**	8101–206
51619	**30**	**Pole Piece (R. H.)**	8250–45
51618	**31**	**Pole Piece (L. H.)**	8250–44
96905	**32**	**Armature, with Bracket and Trunnions** (Inc. 1-33, 1-34 and 2-35)	C–7459–8
71416	**33**	**Armature only** for Ref. 32	8157–230
50225	**34**	**Armature Bracket only** for Ref. 32	8303–68
47579	**35**	**Trunnion only** for Ref. 32	8378–197

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
SQUARE BASE (FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	36	**Screw with Nut,** used in shipping (Inc. 1-36a and 1-48)	12471
63316	**36a**	**Screw only,** for Ref. 36	8098–951
121374	**36b**	**Screw,** used in place of Ref. 36 when installed	8098–1289
	37	**Machine Screw No. 8-36x½″** Fil. Hd. Br. for fastening Ref. 32 to Pole Piece.	
49067	**38**	**Dowel Pin** for Ref. 32	8097–336
	39	**Drive Screw No. 4x$\frac{3}{16}$″** Hardened, for fastening Ref. 40 to Back Strap.	
46539	**40**	**Name Plate**	8225–135
49141	**41**	**Screw (Core Pin)**	8098–887
26942	**42**	**Nut** for Ref. 41	8109–184
51623	**43**	**Back Strap**	8162–152
29101	**44**	**Nut**	8109–193
29102	**45**	**Washer**	7828–139
56635	**46**	**Nut** for Ref. 66	8109–324
29104	**47**	**Washer**	7828–138
29103	**48**	**Nut**	8109–194
31670	**49**	**Nut** for Ref. 61	8109–218
122646	**50**	**Washer**	8078–1366
	51	**Machine Screw No. 6-40x½″** Fil. Hd. S. Blued for fastening Ref. 73 to Terminal Post.	
32186	**52**	**Lock Washer** for Ref. 61	8486–129
51610	**53**	**Nut** for Ref. 29	8265–161

PLATE E-4838

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
SQUARE BASE (FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
22621	**54**	**Bushing**	8095–199
19409	**55**	**Lock Washer** for Ref. 54	8486–68
1515	**56**	**Nut** for Ref. 54	8109–23
30274	**57**	**Terminal Post only,** for Ref. 58	8094–641
72926	**58**	**Terminal Post with Nuts, Washers, Screws and Graphite Contact Tip** (Inc. 1-57, 1-59, 2-44, 2-45, 1-51, 1-60 and 1-73)	12451–54
30812	**59**	**Terminal Post only,** for Ref. 58	8094–639
30810	**60**	**Screw** for fastening Ref. 57 to Ref. 59	8098–538
91828	**61**	**Terminal Post with Nuts, Washers, Lock Washers and L. V. Back Contact Post** (Inc. 1-62, 1-63, 2-44, 2-45, 1-47, 1-49, 2-48, 2-52 and 1-79)	12451–20
112832	**61a**	**Terminal Post with Nuts, Washers, Lock Washers and H. V. Back Contact Post** (Inc. 1-62, 1-63, 2-44, 2-45, 1-47, 1-49, 2-48, 2-52 and 1-81)	12451–20
30813	**62**	**Terminal Post only,** for Ref. 61	8094–639
46277	**63**	**Terminal Post only,** for Ref. 61	8094–874
	64	**Terminal Post with Nuts, Washers, and Lock Washers for Terminal Connector** (Inc. 1-64a, 2-44, 2-45, 1-48, 1-47 and 1-71)	12451
30108	**64a**	**Terminal Post only,** for Refs. 64 and 65	8094–706
	65	**Terminal Post with Nuts and Washers for Magnet Lead** (Inc. 1-65a, 2-44, 3-45, 2-48 and 1-47)	12451
29147	**65a**	**Terminal Post only** for Refs. 65 and 66	8094–706
	66	**Terminal Post with Nuts and Washers for Magnet Lead** (Inc. 1-65a, 2-48, 1-45, 1-47 and 1-46)	12451–121

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
SQUARE BASE (FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
59306	**67**	**Screw,** for fastening Top Plate to Corner Post.....	8098–1172
59371	**68**	**Screw,** for fastening Top Plate to Corner Post.....	8098–1172
73493	**69**	**Washer** for Ref. 68.....	7826–78
37661	**70**	**Anchor Washer** for Ref. 67.....	7828–168
132658	**71**	**Lock Washer** for Ref. 64.....	8486–369
97875	**72**	**Terminal Connector**.....	10934–162
30811	**73**	**Graphite Contact Tip**.....	8341–32
94436	**74**	**Dummy Post with Nut and Washers for Front of Relay** (Inc. 1-74a, 1-76, 1-47 and 1-48)	12471–3
31067	**74a**	**Dummy Post only,** for Refs. 75 and 76.....	8098–558
98875	**75**	**Dummy Post, with Nut and Washers for Back of Relay** (Inc. 1-74a, 1-76, 1-48 and 1-77).....	12471–11
36088	**76**	**Washer** for Refs. 74 and 75.....	7826–136
31068	**77**	**Washer** for Ref. 75.....	7828–144

Contact Springs

Piece	Ref.	Description	Remarks	Drawing Reference
69755	**78**	**L. V. Front and Back**		8385–1320
69756	**78a**	**L. V. Front**		8385–1321
76584	**78b**	**L. V. Front and H. V. Back**		8385–1815
86140	**78c**	**L. V. Back**		8385–1320

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
SQUARE BASE (FOUR-POINT)
(Continued)

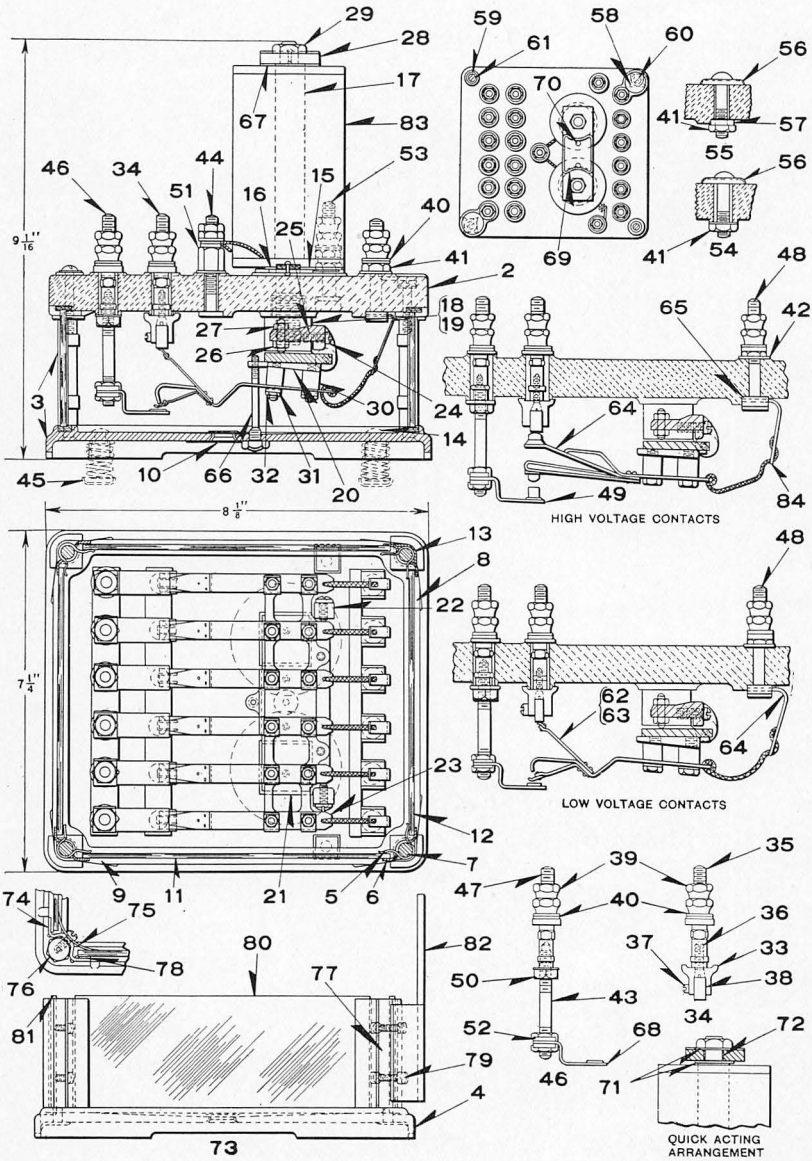
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Remarks	Drawing Reference
69759	**79**	**H. V. Front and Back**		8385–1334
76280	**79a**	**H. V. Front**		8385–1338
76198	**79b**	**H. V. Front and L. V. Back**		8385–1336
82292	**79c**	**H. V. Back**		8385–1652

Piece	Ref.	Description	Drawing Reference
74804	**80**	**Back Contact Post** (Silver Tip 1/4″ Diam.).....	8094–2034
80916	**80a**	**Back Contact Post** (Silver Tip 3/8″ Diam.)	8094–2034
76384	**81**	**Back Contact Post** (H. V.).....	8094–2034
	82	**Magnet Coil complete with Leads and Terminals** (for details refer to Plate E-5025).....	8133

PLATE E-4840

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 13 NEUTRAL RELAY
(SIX-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

(SIX-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
76774	**2**	**Top Plate with Gasket**	C–7459–12
71607	**3**	**Bottom Plate with Glass Shields, Gasket, Ventilator and Supports** (Inc. 1-4, 4-5, 4-6, 4-7, 2-8, 2-9, 1-10, 2-11, 2-12 and 1-13)	C–7459–10
145323	**3a**	**Bottom Plate with Glass Shields, Gasket, Ventilator, Supports Posts, and Shock Absorber Springs** (Inc. 1-4a, 4-5, 4-6, 4-7, 2-8, 2-9, 1-10, 2-11, 2-12, 1-13 and 4-45)	C–7459–19
51151	**4**	**Bottom Plate,** only for Refs. 3 and 73	C–7459–10
145322	**4a**	**Bottom Plates with Studs** for Ref. 3a (Inc. 1-4a and 4-14)	C–7459–19
44224	**5**	**Support**	10932–10
44225	**6**	**Support**	10932–11
51559	**7**	**Post**	8114–298
37395	**8**	**Gasket (End)** for Refs. 3, 3a and 73	8078–559
37396	**9**	**Gasket (Side)** for Refs. 3, 3a and 73	8078–559
34340	**10**	**Ventilator** for Refs. 3, 3a and 73	C–7459–6
51561	**11**	**Glass Shield (Side)** for Refs. 3 and 3a	8163–107
51414	**12**	**Glass Shield (End)** for Ref. 3 and 3a	8163–145
130381	**13**	**Lining**	10932–52
145116	**14**	**Stud** for Ref. 4a	8114–631
76071	**15**	**Core Plate**	C–7459–10
51611	**16**	**Washer**	7828–218
51617	**17**	**Core**	8101–206

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
(SIX-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
51619	**18**	**Pole Piece R. H.**	8250–44
51618	**19**	**Pole Piece L. H.**	8250–44
96904	**20**	**Armature with Bracket and Trunnions** (Inc. 1-21, 1-22 and 2-23)	C–7459–8
72163	**21**	**Armature only,** for Ref. 20	8157–224
50225	**22**	**Armature Bracket only,** for Ref. 20	8303–68
47579	**23**	**Trunnion** for Ref. 20	8378–197
	24	**Machine Screw No. 8-36x½″** Fil. Hd. Br. for fastening Ref. 22 to Pole Piece.	
49067	**25**	**Dowel Pin** for Ref. 22	8097–356
49141	**26**	**Screw (Core Pin)** with Nut Ref. 27	8098–880
26942	**27**	**Nut** for Ref. 26	8109–184
51623	**28**	**Back Strap**	8162–152
51610	**29**	**Nut** for Ref. 17	8265–161
22621	**30**	**Bushing**	8095–199
19409	**31**	**Lock Washer** for Ref. 30	8486–68
1515	**32**	**Nut** for Ref. 30	8109–23
30274	**33**	**Terminal Post** only for Ref. 34	8094–641
72926	**34**	**Terminal Post, with Nuts, Washers, Screws and Graphite Contact Tip** (Inc. 1-35, 2-39, 2-40, 1-33, 1-37, 1-36 and 1-38)	12451–54
30812	**35**	**Terminal Post** only, for Ref. 34	8094–639
30810	**36**	**Screw** for fastening Ref. 33 to Ref. 35	8098–538

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
(SIX-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	37	**Machine Screw No. 6-40x1/2"** Fil. Hd. Blued Steel for fastening Ref. 38 to Ref. 33.	
30811	38	**Graphite Contact Tip**	8342–32
29101	39	**Nut**	8109–193
29102	40	**Washer**	7828–139
29103	41	**Nut**	8109–194
29104	42	**Washer**	7828–138
46277	43	**Terminal Post** only, for Ref. 46	8094–706
	44	**Terminal Post with Nuts and Washers** (Inc. 1-44a, 2-41, 1-40, 1-42 and 1-51)	12451–121
29147	44a	**Terminal Post** for Refs. 44 and 53	8094–706
410218	45	**Shock Absorber Spring** for Shelf Type Relays.	
91828	46	**Terminal Post with Nuts, Washers, Back Post and Lock Washer** (Inc. 1-47, 2-39, 2-40, 1-43, 2-41, 2-52, and 1-68)	12451–20
112832	46a	**Terminal Post with Nuts, Washers, Back Post and Lock Washer** (Inc. 1-47, 2-39, 2-40, 1-43, 1-49, 2-41 and 2-52)	12451–20
30813	47	**Terminal Post** only, for Ref. 46	8094–639
	48	**Terminal Post with Nuts, Washers, and Lock Washer** (Inc. 1-48a, 2-39, 2-40, 1-41, 1-42 and 1-65)	12451
30108	48a	**Terminal Post** only, for Ref. 48	8094–706
76384	49	**Back Contact Post (High Voltage)**	8094–2034
31670	50	**Nut**	8109–218

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY (SIX-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
56635	**51**	**Nut** for Ref. 44	8109–324
32186	**52**	**Lock Washer** for Ref. 46	8486–129
	53	**Terminal Post with Nuts and Washers for Magnet Coil Leads** (Inc. 1-44a, 2-39, 3-40, 2-41 and 1-42)	12451
94436	**54**	**Dummy Post with Nuts and Washers for Front of Relay** (Inc. 1-54a, 1-56, 1-42 and 1-41)	12451–3
31067	**54a**	**Dummy Post** only for Refs. 54 and 55	8098–558
98875	**55**	**Dummy Post with Nuts and Washers for Back of Relay** (Inc. 1-54a, 1-56, 1-57 and 1-41)	12451–11
36088	**56**	**Washer** for Refs. 54 and 55	7826–136
31068	**57**	**Washer** for Ref. 55	7828–144
37661	**58**	**Anchor Washer** for Ref. 60	7828–168
73493	**69**	**Washer** for Ref. 61	7826–78
59306	**60**	**Screw** for fastening Top Plate to Corner Post	8098–1172
59371	**61**	**Screw** for fastening Top Plate to Corner Post	8098–1172

Contact Springs

Piece	Ref.	Description	Remarks	Drawing Reference
69755	**62**	**L. V. Front and Back**		8385–1320
76584	**62a**	**L. V. Front and H. V. Back**		8385–1815
69756	**63**	**H. V. Front**		8385–1321

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
(SIX-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Remarks	Drawing Reference
86140	**63a**	**H. V. Back**		8385–1320
69759	**64**	**H. V. Front and Back**		8385–1334
76280	**64a**	**H. V. Front**		8385–1338
76198	**64b**	**H. V. Front and L. V. Back**		8385–1336

Piece	Ref.	Description	Drawing Reference
132658	**65**	**Lock Washer** for Ref. 48	8486–369
	66	**Screw with Nut** (Inc. 1-66a and 1-41) used for shipping	12471
51613	**66a**	**Screw** only for Ref. 66	8098–951
121374	**66b**	**Screw** (Used in place of Ref. 66 when installed)	8098–1289
122646	**67**	**Washer**	8078–1366
74804	**68**	**Back Contact Post (Low Voltage) (Silver Tip 1/4″ Diam.)**	8094–2034
80916	**68a**	**Back Contact Post (Low Voltage) (Silver Tip 3/8″ Diam.)**	8094–2034
46539	**69**	**Name Plate**	8225–135
	70	**Drive Screw No. 4x3/16″** Hardened (N. P.) for fastening Ref. 69 to Back Strap.	
25153	**71**	**Washer** (Used for Quick Acting Relay)	7828–127
25107	**72**	**Bushing** (Used for Quick Acting Relay)	C–7459–2
140276	**73**	**Bottom Plate with Glass Shields, Gasket, Ventilator, Supports, Posts and Wall Bracket, for Wall Type Relay** (Inc. 1-4, 4-74, 4-75, 2-76, 2-77, 8-78, 2-9, 2-10, 12-79, 2-80, 2-81, 1-10, and 1-82)	C–7459–18

UNION SWITCH & SIGNAL COMPANY

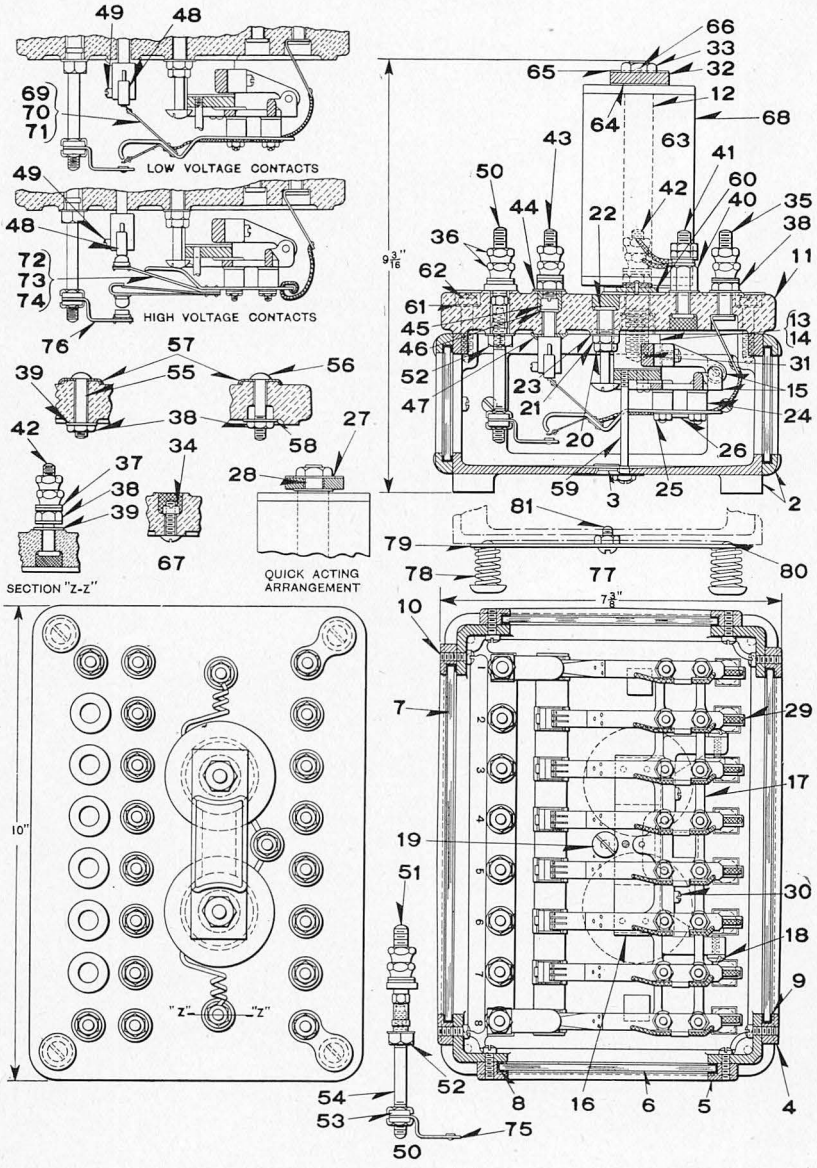
DETAILS OF MODEL 13 NEUTRAL RELAY
(SIX-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
60608	**74**	**Support**	10932–48
60606	**75**	**Support**	10932–38
60610	**76**	**Post**	8115–148
119778	**77**	**Post**	8115–148
60612	**78**	**Gasket**	8078–807
	79	**Machine Screw No. 8-36x$\frac{5}{16}$″** Fil. Hd. S. (Cad. Pl.)	
60616	**80**	**Glass Shield (Side)**	8163–186
60615	**81**	**Glass Shield (End)**	8163–186
140214	**82**	**Wall Bracket**	C–7459–16
	83	**Magnet Coil complete with Leads and Terminals** (for details refer to Plate E-5025)	8133
97875	**84**	**Terminal Connector**	10934–162

PLATE E-4841

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 13 NEUTRAL RELAY
(EIGHT-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

(EIGHT-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
124284	**2**	**Case with Doors, Glass Shields, Gasket and Screws** (Inc. 1-2a, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9 and 8-10)	C–8848–4
97159	**2a**	**Case with Ventilator** for Ref. 2	C–8849–3
34340	**3**	**Ventilator**	C–7459–6
97162	**4**	**Door (Side)**	C–8849–3
92119	**5**	**Door (End)**	C–8122–5
92098	**6**	**Glass Shield (End)**	8163–255
97171	**7**	**Glass Shield (Side)**	8163–255
92088	**8**	**Gasket (End)**	8078–1268
95864	**9**	**Gasket (Side)**	8078–1268
	10	**Machine Screw No. 10-30x½″** Fil. Hd. S. (Cad. Pl.) for fastening Doors to Case.	
97166	**11**	**Top Plate**	C–8849–4
51617	**12**	**Core**	8101–206
51619	**13**	**Pole Piece R. H.**	8250–44
51618	**14**	**Pole Piece L. H.**	8250–44
113250	**15**	**Armature with Contact Bracket and Trunnions** (Inc. 1-16, 1-17 and 2-18)	C–8849–2
64868	**16**	**Armature** only for Ref. 15	8303–77
97161	**17**	**Contact Bracket with Armature for Ref. 15**	C–8849–3
47579	**18**	**Trunnion** for Ref. 15	8378–197
	19	**Screw with Nuts, Washer and Bushing** (Inc. 1-19a, 1-20, 1-21, 1-22 and 1-23)	12471

PLATE E-4841

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

(EIGHT-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
65533	**19a**	**Screw** only, for Ref. 19	8098–1249
26545	**20**	**Nut** for Ref. 19	8109–181
29577	**21**	**Nut** for Ref. 19	8109–205
97167	**22**	**Bushing** for Ref. 19	8350–637
29256	**23**	**Washer** for Ref. 19	7828–141
22621	**24**	**Bushing**	8095–199
1515	**25**	**Nut** for Ref. 24	8109–23
65529	**26**	**Lock Washer** for Ref. 24	8486–337
25153	**27**	**Washer** (Used for Quick Acting Relay)	7828–127
25107	**28**	**Bushing** (Used for Quick Acting Relay)	C–7459–2
110169	**29**	**Terminal Connector**	10934–166
	30	**Machine Screw No. 8-36x½" Fil. Hd. Br.** for fastening Ref. 17 to Pole Piece.	
49067	**31**	**Dowel Pin** for Ref. 17	8097–336
51623	**32**	**Back Strap**	8162–152
51610	**33**	**Nut** for Ref. 12	8265–161
72948	**34**	**Nut** for Ref. 67	8109–383
78078	**35**	**Terminal Post with Nuts and Washers for Terminal Connector** (Inc. 1-35a, 2-36, 2-37, 1-38 and 1-39)	12451–44
29145	**35a**	**Terminal Post only**, for Refs. 35, 41 and 42	8094–706
29101	**36**	**Nut**	8109–193
29102	**37**	**Washer**	7828–139

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

(EIGHT-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
29103	**38**	**Nut**	8109–194
29104	**39**	**Washer**	7828–138
56635	**40**	**Nut** for Ref. 41	8109–324
	41	**Terminal Post with Nuts and Washers, for Magnet Leads** (Inc. 1-35a, 2-38, 1-37, 1-39 and 1-40)	12451–121
	42	**Terminal Post with Nuts and Washers for Magnet Leads** (Inc. 1-35a, 2-36, 3-37, 2-38 and 1-39)	12451
	43	**Terminal Post with Nuts, Washers, Screw, Lock Washer and Graphite Contact Tip** (Inc. 1-43a, 2-36, 2-37, 1-38, 1-44, 1-45, 1-46, 1-47, 1-48 and 1-49)	12451
97177	**43a**	**Terminal Post only,** for Ref. 43	8094–2072
69705	**44**	**Washer,** for Ref. 43	7828–287
69706	**45**	**Nut** for Ref. 43	8109–383
70539	**46**	**Lead Washer,** for Ref. 43	8274–73
29063	**47**	**Lock Washer,** for Ref. 43	8486–111
30811	**48**	**Graphite Contact Tip**	8341–32
69758	**48a**	**Silver Contact Tip**	8341–71
	49	**Machine Screw No. 6-40x½″** Fil. Hd. Blued Steel for fastening Ref. 48 to Terminal Post.	
	50	**Terminal Post with Nuts, Washers, Lock Washers and Back Post,** (Inc. 1-51, 2-36, 2-37, 2-38, 1-39, 1-52, 2-53, 1-54 and 1-75)	12451–20
	50a	**Terminal Post with Nuts, Washers, Lock Washers and Back Post** (Inc. 1-51, 2-36, 2-37, 2-38, 1-39, 1-52, 2-53, 1-54 and 1-76)	12451–20

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
(EIGHT-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
30813	**51**	**Terminal Post only,** for Ref. 50	8094–639
31670	**52**	**Nut** for Ref. 50	8109–218
32186	**53**	**Lock Washer** for Ref. 50	8486–129
31064	**54**	**Terminal Post only,** for Ref. 50	8094–654
94436	**55**	**Dummy Post with Nut and Washers for Back Contact Post of Relay** (Inc. 1-55a, 1-38, 1-39 and 1-57)	12471–3
31067	**55a**	**Dummy Post only,** for Refs. 55 and 56	8098–558
	56	**Dummy Post with Nut and Washers for Back of Relay** (Inc. 1-55a, 1-38, 1-57 and 1-58)	12471
36088	**57**	**Washer** for Refs. 55 and 56	7826–136
2615	**58**	**Washer** for Ref. 56	7828–10
	59	**Screw with Nut** (Inc. 1-59a and 1-38) (Used in shipping)	12471
51612	**59a**	**Screw only,** for Ref. 59	8098–951
121374	**59b**	**Screw** (Used in place of Ref. 59 when installed)	8098–1289
76071	**60**	**Core Plate**	C–7459–10
26381	**61**	**Washer** for Ref. 62	7826–78
	62	**Machine Screw No. 10-30x1″** Fil. Hd. S. (Cad. Pl.) for fastening Top Plate to Case.	
51611	**63**	**Washer**	7828–218
122646	**64**	**Washer**	8078–1366
65124	**65**	**Name Plate**	8225–165
	66	**Drive Screw No. 4x$\frac{3}{16}$″** Hardened for fastening Ref. 65 to Back Strap.	

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY (EIGHT-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	67	**Dummy Post with Nut for Front Contact Post Holes of Relay** (Inc. 1-67a and 1-34)	12471
	67a	**Machine Screw No. 14-24x¾″** Rd. Hd. S. (Cad. Pl.) for Ref. 67.	
	68	**Magnet Coil complete with Leads and Terminals** (for details refer to Plate E-5025)	8133

Contact Springs

Piece	Ref.	Description	Remarks	Drawing Reference
97173	**69**	**L. V. Front and Back**	Back Contact Tip $\frac{3}{16}$″ Wide	8385–1614
140570	**69a**	**L. V. Front and Back**	Back Contact Tip $\frac{3}{8}$″ Wide	8385–2056
75956	**69b**	**L. V. Front and Back**		8385–1320
97174	**70**	**L. V. Front**		8385–1620
112122	**71**	**L. V. Back**		8385–1614
69759	**72**	**H. V. Front and Back**		8385–1334
76198	**73**	**H. V. Front and L. V. Back**		8385–1336
76584	**73a**	**L. V. Front and H. V. Back**		8385–1815
76280	**74**	**H. V. Front**		8385–1338

UNION SWITCH & SIGNAL COMPANY

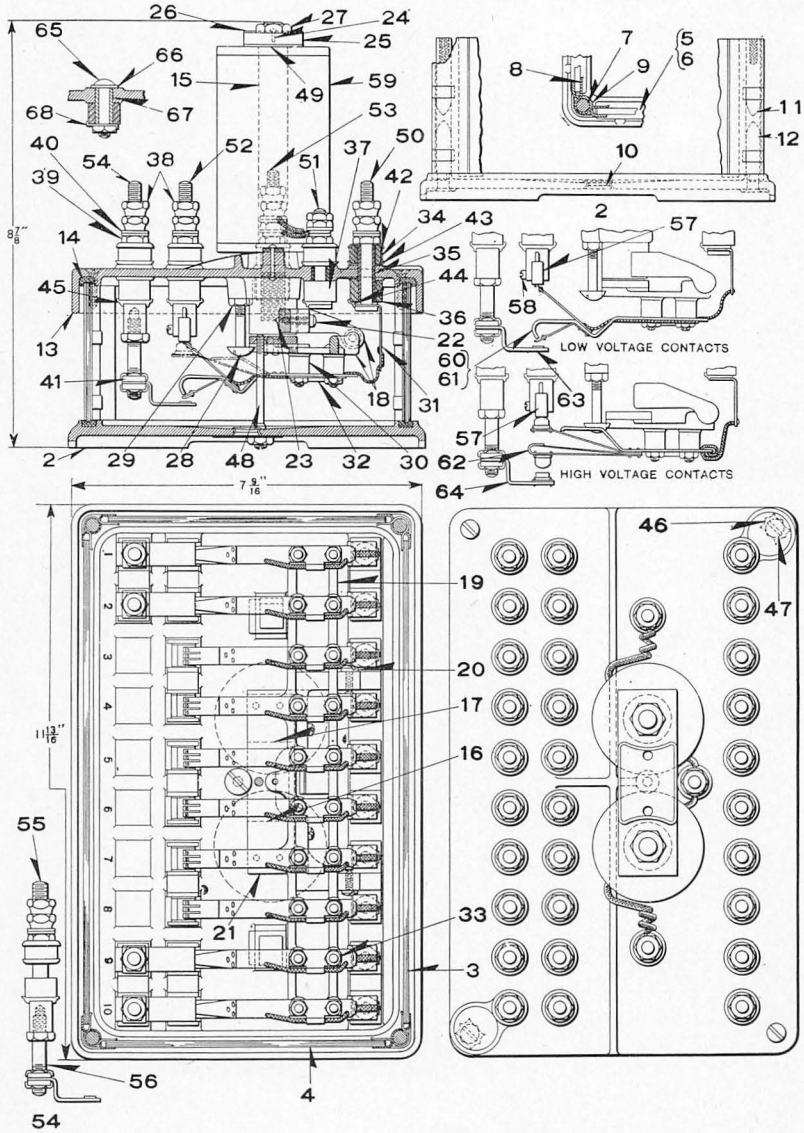
DETAILS OF MODEL 13 NEUTRAL RELAY
(EIGHT-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
74804	**75**	**Back Contact Post (Silver Tip 1/4″ Diam.)**	8094–2034
80916	**75a**	**Back Contact Post (Silver Tip 3/8″ Diam.)**	8094–2034
76384	**76**	**Back Contact Post (Graphite Tip 5/16″ Diam.)**	8094–2034
127232	**76a**	**Back Contact Post (Graphite Tip 13/32″ Diam.)**	8094–2034
136008	**77**	**Plate with Shock Absorber Springs, Studs, Screw and Nut for Model 13 8-Point Relay**	12404–15
410218	**78**	**Shock Absorber Spring.**	
136006	**79**	**Plate** only for Ref. 77	9999–363
148052	**80**	**Stud** only for Ref. 77	8114–631
	81	**Machine Screw No. 14-24x1/2″** Rd. Hd. S. (Cad. Pl.) with Nut Ref. 38.	

PLATE E-4842

UNION SWITCH & SIGNAL COMPANY



DETAILS OF MODEL 13 NEUTRAL RELAY
(TEN-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

(TEN-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
78015	**2**	**Base Plate with Shields, Gaskets, Studs, Supports, Ventilators and Linings** (Inc. 1-2a, 2-3, 2-4, 2-5, 2-6, 4-7, 4-8, 4-9, 1-10, 4-11 and 4-12)	C–8849–2
64940	**2a**	**Base Plate only**	C–8849–2
65552	**3**	**Glass Shield (Side)**	8163–186
65554	**4**	**Glass Shield (End)**	8163–186
65534	**5**	**Gasket (End)**	8078–559
44266	**6**	**Gasket (Side)**	8078–559
57446	**7**	**Stud**	8114–298
58556	**8**	**Support**	10932–10
58557	**9**	**Support**	10932–11
34340	**10**	**Ventilator**	C–7459–6
130800	**11**	**Lining**	10932–52
130381	**12**	**Lining**	10932–52
79774	**13**	**Top Plate with Gasket for Relay having 10 Front and 2 Back Contacts**	C–8849–1
125502	**13a**	**Top Plate with Gasket for Relay having 10 Front and 4 Back Contacts**	C–8849–1
141478	**13b**	**Top Plate with Gasket for Relay having 10 Front and 6 Back Contacts**	C–8849–1
142496	**13c**	**Top Plate with Gasket for Relay having 10 Front and 8 Back Contacts**	C–8849–1
142929	**13d**	**Top Plate with Gasket for Relay having 10 Front and 10 Back Contacts**	C–8849–1

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
(TEN-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
78187	**13e**	**Top Plate with Gasket for Relay having 8 Front and 2 Back Contacts**	C–8849–1
96916	**13f**	**Top Plate with Gasket for Relay having 8 Front and 4 Back Contacts**	C–8849–1
81335	**13g**	**Top Plate with Gasket for Relay having 8 Front and 6 Back Contacts**	C–8849–1
65571	**14**	**Gasket** for Ref. 13	8078–559
51617	**15**	**Core**	8101–206
51619	**16**	**Pole Piece R. H.**	8250–44
51618	**17**	**Pole Piece L. H.**	8250–44
96911	**18**	**Armature with Contact Bracket and Trunnions** (Inc. 1-19, 2-20 and 1-21)	C–8849–2
76665	**19**	**Contact Bracket with Armature,** for Ref. 18	C–8849–1
47579	**20**	**Trunnion** for Ref. 18	8378–197
64868	**21**	**Armature only,** for Ref. 18	8303–77
	22	**Machine Screw No. 8-36x½″** Fil. Hd. Br. for fastening Ref. 18 to Pole Piece.	
49067	**23**	**Dowel Pin** for Ref. 18	8097–336
	24	**Drive Screw No. 4x$\frac{3}{16}$″** (N. P.) for fastening Ref. 26 to Back Strap.	
51623	**25**	**Back Strap**	8162–152
65124	**26**	**Name Plate**	8225–165
51610	**27**	**Nut** for Ref. 15	8265–161
	28	**Screw with Nut** (Inc. 1-28a and 1-29)	12471
65533	**28a**	**Screw only,** for Ref. 28	8098–1249

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY
(TEN-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
26545	**29**	**Nut** for Ref. 28	8109–181
22621	**30**	**Bushing**	8095–199
110169	**31**	**Terminal Connector for L. V. Contacts**	10934–166
110168	**31a**	**Terminal Connector for H. V. Contacts**	10934–166
65529	**32**	**Lock Washer** for Ref. 30	8486–337
1515	**33**	**Nut** for Ref. 30	8109–23
33877	**34**	**Insulating Bushing** for Refs. 50, 51, 52, 53 and 54	8095–364
81751	**35**	**Insulating Bushing** for Refs. 50, 51, 52, 53 and 54	B–10270–1
29510	**36**	**Insulating Block** for Refs. 50, 52 and 55	8750–710
32812	**37**	**Insulating Block** for Refs. 51 and 53	8750–756
29101	**38**	**Nut**	8109–193
29103	**39**	**Nut**	8109–194
29102	**40**	**Washer**	7828–139
32186	**41**	**Lock Washer** for Ref. 54	8486–129
29105	**42**	**Washer** for Refs. 50, 51, 52, 53 and 54	7828–140
41105	**43**	**Washer** for Refs. 50, 51, 52, 53 and 54	7828–178
29062	**44**	**Lock Washer** for Refs. 50, 53 and 51	8486–110
29063	**45**	**Lock Washer** for Refs. 52 and 54	8486–111
37661	**46**	**Anchor Washer** for Ref. 47	7828–168
	47	**Machine Screw No. 10-30x⅝"** Flat Hd. Br. for fastening Top Plate to Corner Stud.	

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

(TEN-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	48	**Screw with Nut** (Inc. 1-48a and 1-39) used in shipping.	
51615	48a	**Screw only** for Ref. 48	8098–951
121374	48b	**Screw** (Used in place of Ref. 48 when installed)	8098–1289
122646	49	**Washer**	8078–1366
	50	**Terminal Post with Nuts, Washers, Lock Washer, Insulating Block and Bushing** (Inc. 1-50a, 2-38, 2-40, 1-39, 1-42, 1-34, 1-43, 1-36, 1-35 and 1-44)	12451–97
30109	50a	**Terminal Post only,** for Ref. 50	8094–706
	51	**Terminal Post with Nuts, Washers, Lock Washer, Insulating Block and Bushing for Magnet Lead** (Inc. 1-51a, 3-39, 1-40, 1-42, 1-43, 1-34, 1-44, 1-35 and 1-37)	12451
29147	51a	**Terminal Post only,** for Ref. 51	8094–1138
	52	**Terminal Post with Nuts, Washers, Lock Washer, Insulating Block, Bushing and Graphite Contact Tip** (Inc. 1-52a, 2-38, 1-39, 2-40, 1-42, 1-34, 1-43, 1-36, 1-35, 1-57 and 1-58)	12451
81460	52a	**Terminal Post only,** for Ref. 52	8094–1138
	53	**Terminal Post with Nuts, Washers, Lock Washer, Insulating Block and Bushings for Magnet Leads** (Inc. 1-53a, 2-38, 2-39, 3-40, 1-42, 1-34, 1-43, 1-37, 1-35 and 1-44)	12451
41284	53a	**Terminal Post with Graphite Tip,** for Ref. 53	8094–797
	54	**Terminal Post with Nuts, Washers, Lock Washer, Insulating Block, Bushing and Back Contact Post for Back Contact** (Inc. 1-55, 2-38, 4-39, 2-40, 1-42, 1-34, 1-43, 2-41, 1-56, 1-45 and 1-63)	12451–154
65532	55	**Terminal Post only,** for Ref. 54	8094–1140

UNION SWITCH & SIGNAL COMPANY

DETAILS OF MODEL 13 NEUTRAL RELAY

(TEN-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

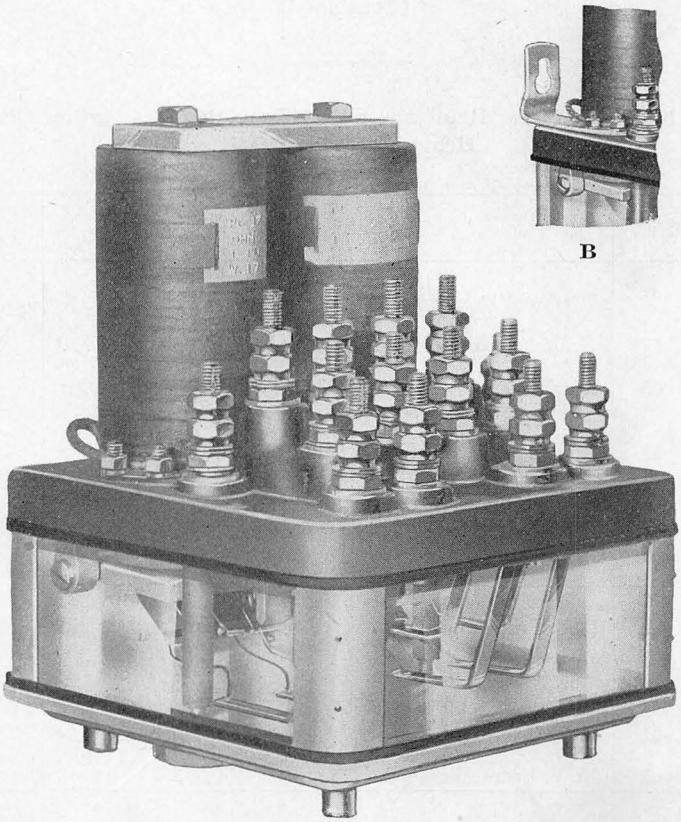
Piece	Ref.	Description	Drawing Reference
65005	**56**	**Terminal Post only,** for Ref. 54	8094–874
111398	**57**	**Graphite Contact Tip**	8341–474
	58	**Machine Screw No. 6-40x½″** Fil. Hd. Blued Steel for fastening Ref. 57 to Terminal Post Ref. 52.	
	59	**Magnet Coil, complete with Leads and Terminals** (for details refer to Plate E-5025)	8133

Contact Springs

Piece	Ref.	Description	Remarks	Drawing Reference
97173	**60**	**L. V. Front and Back**	Back Contact Tip $\frac{3}{16}$″ Wide	8385–1614
81432	**60a**	**L. V. Front and Back**	Back Contact Tip $\frac{3}{8}$″ Wide	8385–1823
97174	**61**	**L. V. Front**		8385–1620
81475	**62**	**H. V. Front and Back**		8385–1334

Piece	Ref.	Description	Drawing Reference
74804	**63**	**Back Contact Post (Silver Tip ¼″ Diam.)**	8094–2034
76384	**64**	**Back Contact Post (Graphite Tip $\frac{5}{16}$″ Diam.)**	8094–2034
	65	**Dummy Post with Nut, Washer, Lock Washer, and Bushing** to fill unused holes in Top Plate (Inc. 1-65a 1-66, 1-67, 1-68 and 1-39)	12471
31067	**65a**	**Dummy Post only,** for Ref. 65	8098–558
29104	**66**	**Washer** for Ref. 65	7828–138
30165	**67**	**Bushing** for Ref. 65	8350–299
65675	**68**	**Lock Washer** for Ref. 65	8486–267

UNION SWITCH & SIGNAL COMPANY



B

A

STYLE DN-11 D. C. NEUTRAL RELAY
(FOUR-POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4950 and E-5030).

The maximum contact combination is four front and four back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

STYLE DN-11 D. C. NEUTRAL RELAYS

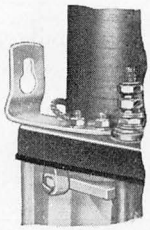
(FOUR-POINT)

For Details of the Four-Point Relay Refer to Plate E-4950.

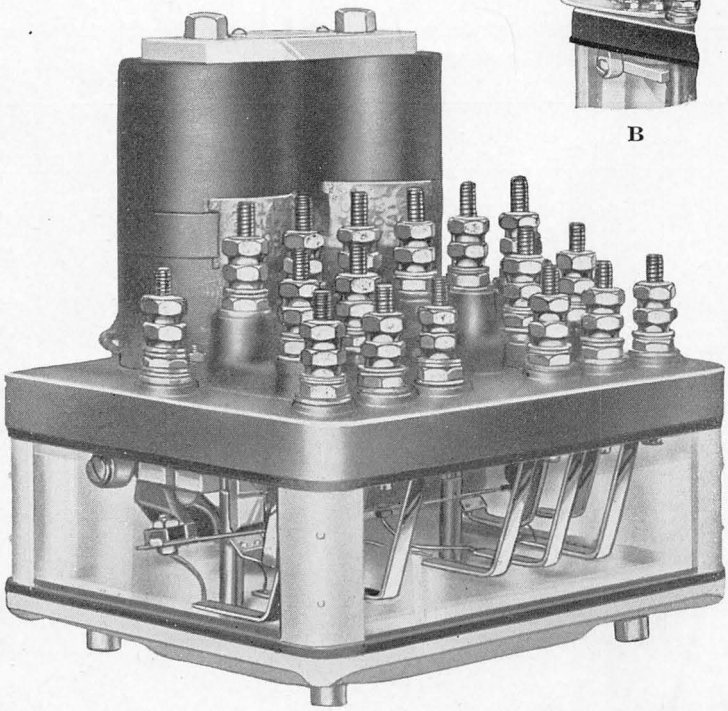
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with four front and two back low voltage contacts....	C–9077–24
	Aa	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with four front and four back low voltage contacts.....	C–9077–24
	B	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with four front and two back low voltage contacts.....	C–9077–24
	Ba	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with four front and four back low voltage contacts.....	C–9077–24

UNION SWITCH & SIGNAL COMPANY



B



A

STYLE DN-11 D. C. NEUTRAL RELAY

(SIX-POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4951 and E-5030).

The maximum contact combination is six front and six back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

STYLE DN-11 D. C. NEUTRAL RELAYS

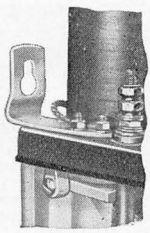
(SIX-POINT)

For Details of the Six-Point Relay Refer to Plate E-4951.

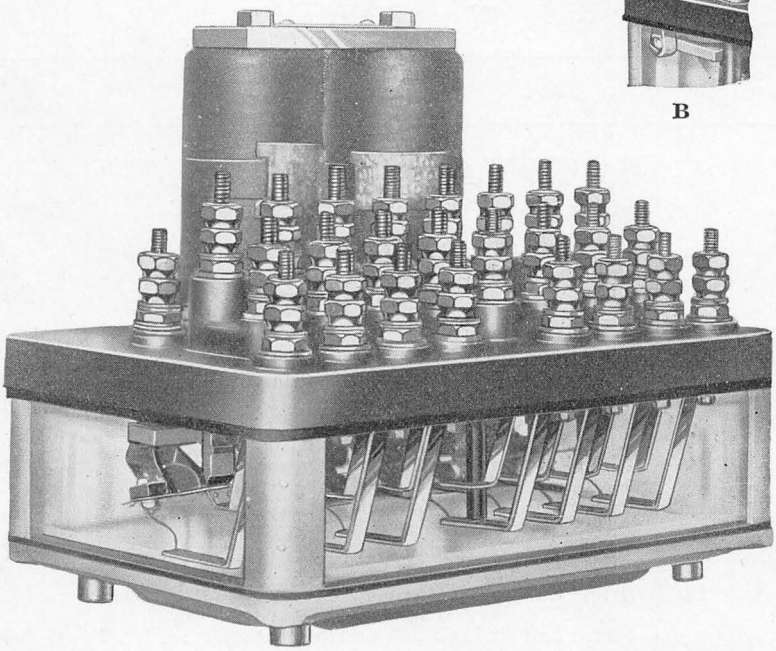
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with six front and two back low voltage contacts.....	C–9077–15
	Aa	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with six front and four back low voltage contacts.....	C–9077–15
	Ab	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with six front and six back low voltage contacts.....	C–9077–15
	B	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with six front and two back low voltage contacts.....	C–9077–15
	Ba	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with six front and four back low voltage contacts.....	C–9077–15
	Bb	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with six front and six back low voltage contacts.....	C–9077–15

UNION SWITCH & SIGNAL COMPANY



B



A

STYLE DN-11 D. C. NEUTRAL RELAY

(EIGHT-POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4952 and E-5030).

The maximum contact combination is eight front and eight back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

STYLE DN-11 D. C. NEUTRAL RELAYS

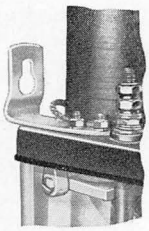
(EIGHT-POINT)

For Details of the Eight-Point Relay Refer to Plate E-4952.

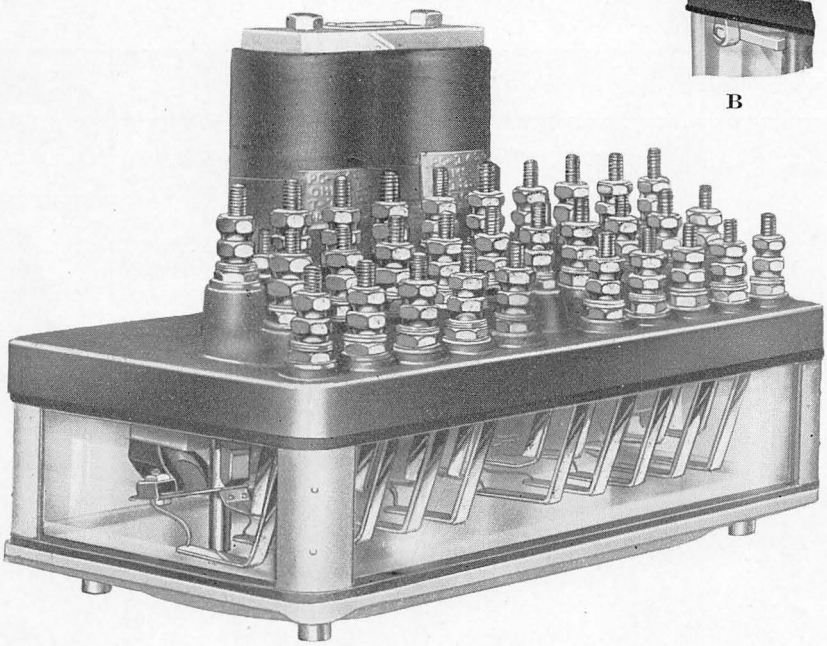
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with eight front and two back low voltage contacts.....	C–9077–48
	Aa	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with eight front and eight back low voltage contacts.....	C–9077–48
	B	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with eight front and two back low voltage contacts....	C–9077–48
	Ba	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with eight front and eight back low voltage contacts...	C–9077–48

UNION SWITCH & SIGNAL COMPANY



B



A

STYLE DN-11 D. C. NEUTRAL RELAY

(TEN-POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4953 and E-5030).

The maximum contact combination is ten front and ten back non-independent contacts.

UNION SWITCH & SIGNAL COMPANY

STYLE DN-11 D. C. NEUTRAL RELAYS

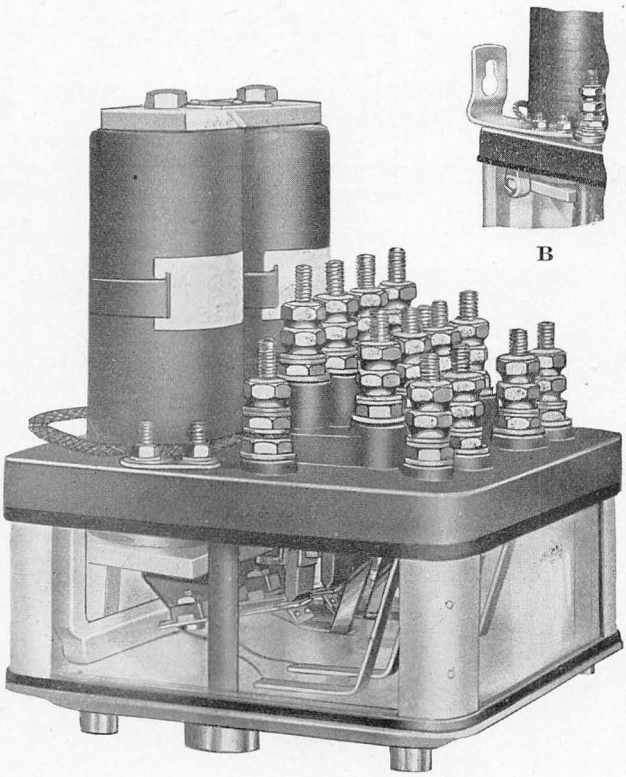
(TEN-POINT)

For Details of the Ten-Point Relay Refer to Plate E-4953.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with ten front and two back low voltage contacts.....	C–9077–51
	Aa	**Style "DN-11" (Shelf Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with ten front and ten back low voltage contacts.....	C–9077–51
	B	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with ten front and two back low voltage contacts.....	C–9077–51
	Ba	**Style "DN-11" (Wall Type) D. C. Neutral Relay, Magnets Ohms per Pair,** complete with ten front and ten back low voltage contacts.....	C–9077–51

UNION SWITCH & SIGNAL COMPANY



B

A

STYLE "DN-12" D. C. TRUNNIONLESS NEUTRAL RELAY
(FOUR AND SIX POINT)

Unless otherwise specified Relays will be furnished with silver to graphite front and silver to silver back contacts. (Low voltage contacts).

If high voltage contacts, or relays with slow or quick release are required, orders should so specify.

Shock absorber springs are not furnished unless called for. (See Plates E-4950 and E-5030).

The maximum contact combination is four front and four back non-independent contacts for the four point relay and six front and six back non-independent contacts for the six point relay.

UNION SWITCH & SIGNAL CO.

STYLE "DN-12" FOUR AND SIX POINT D. C. TRUNNIONLESS NEUTRAL RELAYS

For details of the Four-Point Relay refer to Plate E-4954.
For details of the Six-Point Relay refer to Plate E-4955.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Style "DN-12" (Shelf Type) D. C. Neutral Relay,** magnets ohms per pair, complete with four front and two back low voltage contacts.....	C–9077–37
	Aa	**Style "DN-12" (Shelf Type) D. C. Neutral Relay,** magnets ohms per pair, complete with four front and four back low voltage contacts.....	C–9077–37
	Ab	**Style "DN-12" (Shelf Type) D. C. Neutral Relay,** magnets ohms per pair, complete with six front and two back low voltage contacts.....	C–9077–43
	Ac	**Style "DN-12" (Shelf Type) D. C. Neutral Relay,** magnets ohms per pair, complete with six front and four back low voltage contacts.....	C–9077–43
	Ad	**Style "DN-12" (Shelf Type) D. C. Neutral Relay,** magnets ohms per pair, complete with six front and six back low voltage contacts.....	C–9077–43
	B	**Style "DN-12" (Wall Type) D. C. Neutral Relay,** magnets ohms per pair, complete with four front and two back low voltage contacts.....	C–9077–37
	Ba	**Style "DN-12" (Wall Type) D. C. Neutral Relay,** magnets ohms per pair, complete with four front and four back low voltage contacts.....	C–9077–37
	Bb	**Style "DN-12" (Wall Type) D. C. Neutral Relay,** magnets ohms per pair, complete with six front and two back low voltage contacts.....	C–9077–43
	Bc	**Style "DN-12" (Wall Type) D. C. Neutral Relay,** magnets ohms per pair, complete with six front and four back low voltage contacts.....	C–9077–43
	Bd	**Style "DN-12" (Wall Type) D. C. Neutral Relay,** magnets ohms per pair, complete with six front and six back low voltage contacts.....	C–9077–43

Insert in place of same sheet dated 4-29

UNION SWITCH & SIGNAL CO.

FOUR AND SIX POINT STYLE "DN-18" SLOW PICK-UP, SLOW RELEASE LINE RELAY

(WITH ADJUSTABLE MAGNETIC SHUNT)

For details refer to Plate E-4975

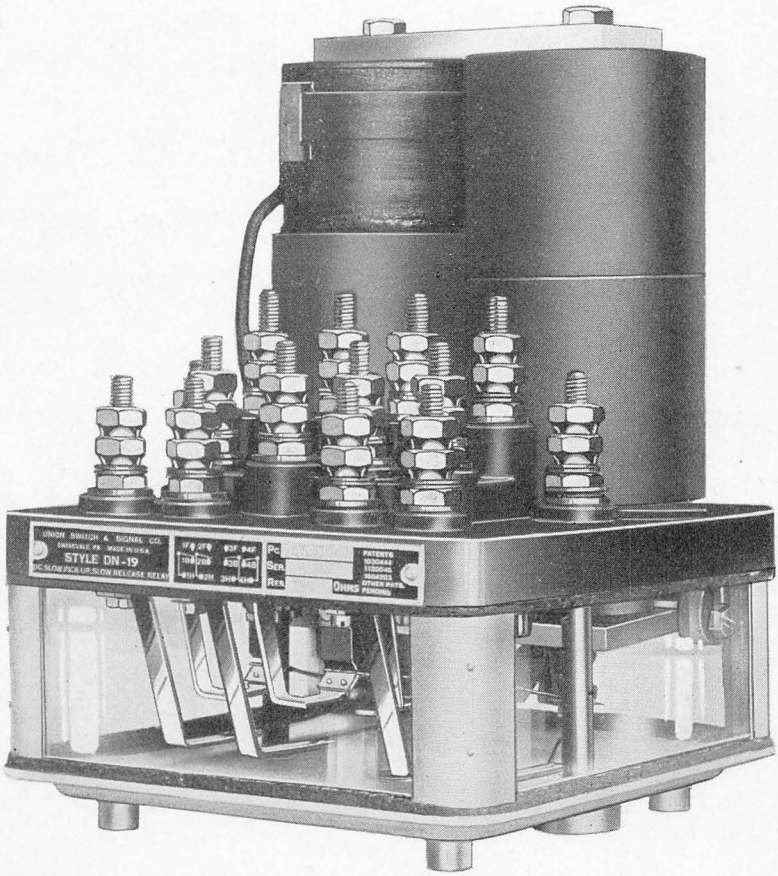
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "DN-18" D.C. Neutral Relay** with four front and four back non-independent contacts as shown. Orders should specify the voltage at which relay is to operate.....	C–9077–74
	B	**Style "DN-18" D.C. Neutral Relay** with six front and six back non-independent contacts. Orders should specify voltage at which relay is to operate.....	C–9077–73
		The resistance selected for the relays depends upon the voltage available at the location. Combinations available are listed in the table below.	

Cells Lead Bat. or Equivalent	Relay Res. Ohms	Contacts
4	225	4F-4B
4	225	6F-6B
5	350	4F-4B
5	350	6F-6B
6	500	4F-4B
6	500	6F-6B

PLATE E-4932

UNION SWITCH & SIGNAL CO.



REF. A—FOUR POINT RELAY—WIDTH 6¼", DEPTH 6¼", HEIGHT 9"
REF. B—SIX POINT RELAY—WIDTH 7⅝", DEPTH 6¼", HEIGHT 9"

STYLE "DN-19" FOUR AND SIX POINT RELAYS

The Style "DN-19" Special Slow Release Relay has the same basic structure as the Style "DN-18" Relay, but eliminates the adjustable magnetic shunt and employs additional copper for retardation in the place thereof. The 225 ohm relay at 8 volts has a pick-up period of 1.4 seconds and a release time of 2.75 seconds.

The "DN-19" relay provides sufficient retardation to bridge the 1.35 second reversal time of the "DP-14" polarized relay, when the polarized relay is operated at its lowest working value. The usual slow release relay does not provide sufficient retardation to bridge this reversal time, and requires that the polarized relay be over-energized somewhat to provide a shorter reversal time. Reducing the energy on the polarized relay is of particular advantage when the polarized relay is used as a track relay and accomplishes the following desirable results: 1. Less power fed into track circuit. 2. Allows the use of larger value of resistor between battery and track, thereby increasing shunting sensitivity, and 3. Makes it possible to work longer track circuits.

UNION SWITCH & SIGNAL CO.

FOUR AND SIX POINT STYLE "DN-19" SPECIAL SLOW RELEASE LINE RELAY

For details refer to Plate E-4975

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "DN-19" D.C. Neutral Relay** with four front and four back non-independent contacts as shown. Orders should specify the voltage at which relay is to operate.....	C–9077–87
	B	**Style "DN-19" D.C. Neutral Relay** with six front and six back non-independent contacts. Orders should specify the voltage at which relay is to operate.....	C–9077–

Primary-Secondary Relay Combination For Improving D. C. Track Circuit Shunting Sensitivity

Purpose: The primary-secondary track relay combination provides reliable track circuit operation for light-weight trains and where conditions of infrequent traffic or poor ballast resistance make operation difficult with standard-type track relays. The primary-secondary combination also provides proper time margins for successive track circuits as required in various signal circuits even with the shortest train equipments.

Explanation of Operation: The operation of the Union primary-secondary combination is shown schematically in Diagram A, Plate E-4934. When both the primary and secondary relays are deenergized, the primary relay coils have terminal S1 connected with terminal S2 through the back contact of the secondary relay to make the full primary coil winding effective for pick-up. When the primary relay picks up, it energizes the secondary relay, and when this relay picks up at the end of the retardation interval it transfers the primary relay to its holding circuit by connecting terminal S1 to S3 and opening S2. The continuity contact on the secondary relay prevents opening of the primary relay circuit during this transfer. Part of the winding of the primary relay is thus cut out and a resistance, which is wound in the coil, is substituted so that when the train shunt is applied, the current has to be reduced to a value only slightly below the pick-up value in order to make the relay release. This change in coil connections also makes the relay shunt out very rapidly.

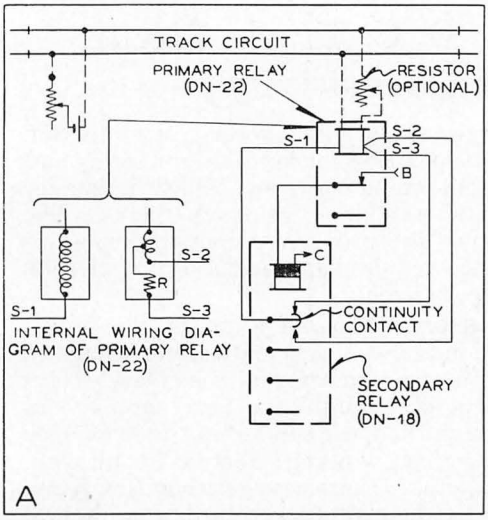
If shunting conditions are particularly severe, further improvement can be obtained by using the series resistor as shown between the rails and the primary relay, together with an increased voltage across the rails. (See Test Run No. 5 as discussed in U.D. 236).

The circuit shown in Diagram B is applicable at locations where a neutral track relay controls a polarized line relay at the same location. In this application the DP-21 Relay may perform the functions of three relays: (1) slow pick-up secondary relay, (2) standard polarized relay, and (3) slow-release repeater of the polarized relay. The DP-21 Relay is slow pick-up and is made to release quickly in this application by opening the circuit of the retaining coils at the same time that the main coil circuit is open.

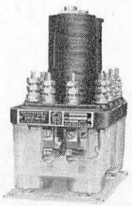
Advantages of the Union Primary-Secondary Combination:

1. Increased shunting sensitivity because of high release value and extremely quick shunting.
2. Low track circuit operating current (only 0.062 amp. working value for the 4-ohm relay, which is commonly used. Other resistances are available to suit individual requirements).

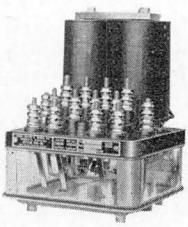
(Continued Under List)



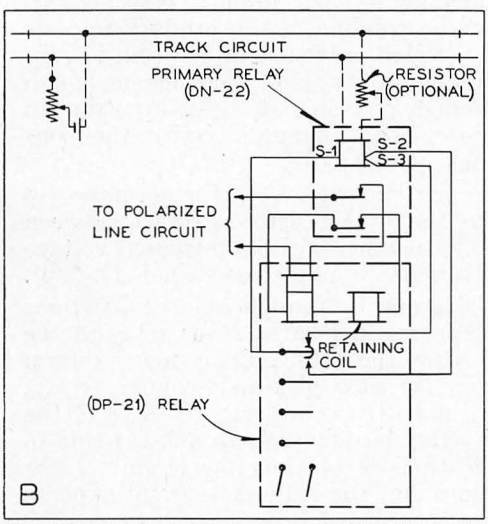
PRIMARY-SECONDARY RELAY COMBINATION USING STYLE DN-22 PRIMARY RELAY AND STYLE DN-18 SLOW PICK-UP, ORDINARY RELEASE SECONDARY RELAY.



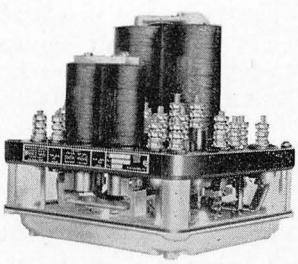
Style DN-22
Primary Relay



Style DN-18
Secondary Relay



PRIMARY-SECONDARY RELAY COMBINATION USING STYLE DN-22 PRIMARY RELAY AND STYLE DP-21 SECONDARY RELAY CONNECTED TO BE ORDINARY RELEASING. USED WHEN CONTROL CIRCUIT IS POLARIZED.



Style DP-21 (Polarized)
Secondary Relay

Primary-Secondary Relay Combination

Primary-Secondary Relay Combination For Improving D. C. Track Circuit Shunting Sensitivity

The primary or track relay is always a Style DN-22 two front and one back dependent contact relay Plate E-4935 with special winding on one coil.
The secondary or track repeater relay may be either a Style DN-18 relay (Plate E-4930) for neutral control circuits or a Style DP-21 relay (Plate E-5121) for polarized control circuits. Each secondary relay is equipped with one continuity contact on the neutral armature.
Shock absorber bases and wall mounting brackets if required for secondary relays may be ordered from Plates E-4975 or E-5168.
Style DN-22 primary relays are equipped with shock absorber bases. Orders should mention whether for shelf or wall mounting. (Refs. 56 or 57, Plate E-4978).

Order by Plate, Piece, Reference and Description

Piece	Ref.	Description	Drawing Reference
	A	**Primary-Secondary Relay Combination** consisting of one . . . ohms Style DN-22 primary relay Plate E-4935 and one (4 or 6) point Style DN-18 (neutral) secondary relay Plate E-4930. Mention number and type (lead or Edison storage, or primary) cells available for operation of the secondary relay.	
	B	**Primary-Secondary Relay Combination** consisting of one . . . ohms Style DN-22 primary relay Plate E-4935 and one (4 or 6) point Style DP-21 (polarized) secondary relay Plate E-5121. Mention number and type (lead or Edison storage, or primary) cells available for operation of the secondary relay.	

(Continued from first page of Plate E-4934)

3. Protection against intermittent loss of shunt because of slow pick-up, quick-release secondary relay and special continuity contact which transfers the primary relay to its holding circuit before closing the signal control contacts.
4. Directional setups that depend upon operation of relays in successive track circuits are definitely maintained. When used for two track circuits in succession, the quick-releasing, slow pick-up characteristic of the secondary relays will provide time for the pick-up of a standard relay over the back contacts of the two secondary relays regardless of the length and speed of operation of the cars involved.
5. High-efficiency secondary relays. These can be operated from signal battery if available, or from track battery used as local battery. For example, a 90-ohm DN-18 relay is used for 2-Volt battery.

Height $7\frac{9}{16}$", Width 4", Depth $6\frac{3}{8}$"

Style "DN-22" D.C. Neutral Relay

The standard "DN-22" two contact relay meets the demand for a quick shunting track relay, especially for applications where light equipment, such as light engines, or gas electric cars are in use at high speeds. A particular application is its use in a primary-secondary relay combination with the "DN-18" slow pick-up relays, or with the "DP-21" relay. For line use where a two contact relay is desired, the relay is equipped with the "DN-11" relay line coils.

APPLICATION:

1—As line or track relay where the necessary number of contacts does not exceed its capacity.

2—As track relay (with or without repeater) where quick shunting is a requisite. This is obtained with the "ordinary acting" assembly. Faster action is obtained by specifying "quick acting."

3—As track relay to control a repeater relay located in tower.

4—As special track relay with a repeater (Primary-Secondary Relay Combination). Such as "DN-18" slow pick-up ordinary release relay or "DP-21" slow pick-up retained neutral polarized relay.

5—For special application to A.P.B. where the requirement is two front contacts for signal control and one independent back contact for picking up a stick relay.

The "DN-22" line has been expanded to include the "DN-22A," "DN-22L" and "DN-22P," which are listed and described on plates following this one.

Style "DN-22" D.C. Neutral Relays

For details refer to Plate E-4978. Shock Absorber Bases (Ref. 56, Plate E-4978) or Wall Mounting Brackets (Ref. 57, Plate E-4978) are not furnished unless called for. Orders should specify resistance per pair of Coils. (See Ref. 8a, Plate E-5025).

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "DN-22" D.C. Neutral Relay, Magnet Coils .. Ohms Per Pair Dwg. C-9432-3.					
Piece	Ref.	Contact Combination	Contact Members		
			Front Post	Back Post	Spring
	Aa	2F-2B Dependent (Low Voltage)	S.I.C.	S.	S.
	Ab	2F-1B Independent (Low Voltage)	S.I.C.	S.	S.
	Ac	2F-2B Dependent (High Voltage)	S.I.C.	S.I.C.	S.I.C.

When ordering the above Relays, orders should be accompanied with the following information:—

(1) Type—Line or Track. If for track use, state whether for primary-secondary use.

(2) Resistance.

(3) Type of Contacts.

The following contact equipment is available:

Low Voltage (First range voltage)—silver to silver impregnated carbon front, silver to silver back.

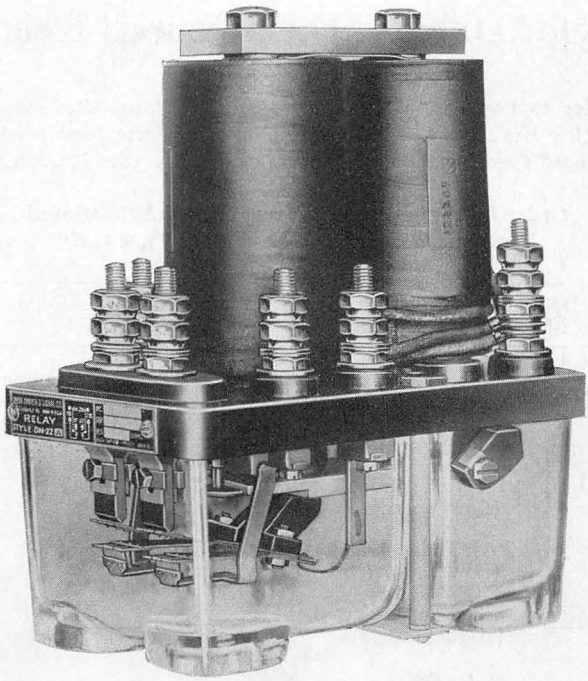
High Voltage (Second range voltage)—silver impregnated carbon to silver impregnated carbon, front and back.

(For second range voltage A.C. it is common practice to use silver to silver impregnated carbon front and back contacts).

NOTE:—Meanings of above abbreviations—

S.I.C.—Silver Impregnated Carbon.

S.—Silver.



Height $7\frac{23}{32}$", Width 4", Depth $6\frac{3}{8}$"

Style "DN-22A" D.C. Neutral Relay

The Style "DN-22A" Relay for series line approach lighting service is recommended for new work, or for revisions to existing installations, where relays must meet the new A.A.R. Specification No. 101-37 requiring heavier armature torques and the same safety standards as exist in standard track relays. This relay in approach lighting is adaptable only to series line service and cannot be used as a track approach lighting relay. For series track approach lighting service the Style "DNL-4" will have to be used on account of the adjustable features necessary in the magnetic circuit to obtain calibration.

The "DN-22A" Relay is not interchangeable in existing approach lighting circuits using the "DNL" type relays without making a change in the resistances of the line relays in series, or adding cells to line battery.

In series line service in which it is necessary that the series relay be able to stay in the energized position while some other relay is transferring from front to back, or back to front contacts, a rectifier snub is provided, mounted on the relay backstrap, to provide the necessary slow release effect. This relay can also be supplied with the standard slow release coils used on "DN-11" Relays, providing an efficient slow release relay.

For additional information on Style "DN-22" Relays, see Plate E-4935.

Style "DN-22A" D.C. Neutral Relays

For details refer to Plate E-4978. Shock Absorber Bases (Ref. 56, Plate E-4978) or Wall Mounting Brackets (Ref. 57 or 57a, Plate E-4978) are not furnished unless called for. Orders should specify resistance per pair of Coils. (See Ref. 8a, Plate E-5025).

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "DN-22A" D.C. Neutral Relay, Magnet Coils .. Ohms Per Pair Dwg. C-9432-8.

Piece	Ref.	Contact Combination	Contact Members		
			Front Post	Back Post	Spring
	A	2F-2B Dependent (Low Voltage)	S.I.C.	S.	S.
	Aa	2F-1B Independent (Low Voltage)	S.I.C.	S.	S.

When ordering the above Relays, orders should be accompanied with the following information:—

(1) Type—Ordinary, Slow Release or Rectifier Snub.

(2) If Rectifier snub, state voltage across rectifier, or give type and resistance of line relay to work in series, and voltage of circuit.

(3) Resistance.

(4) Type of contacts.

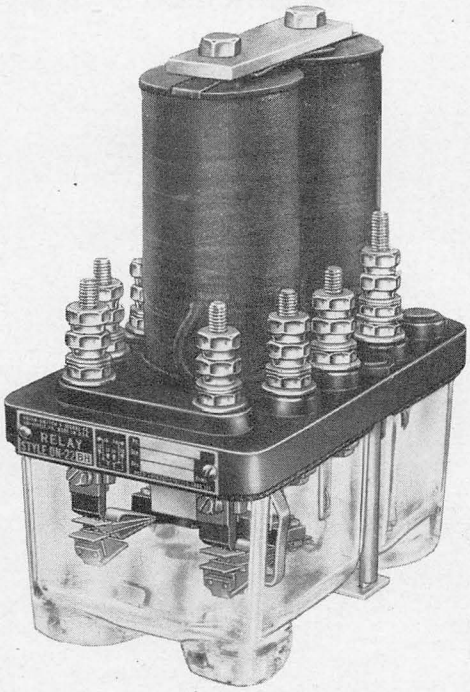
The following contact equipment is available:

Low Voltage (First range voltage)—silver to silver impregnated carbon front, silver to silver back.

High Voltage (Second range voltage)—silver impregnated carbon to silver impregnated carbon, front and back.

(For second range voltage A.C. it is common practice to use silver to silver impregnated carbon front and back contacts).

NOTE:—Meanings of above abbreviations—
S.I.C.—Silver Impregnated Carbon.
S.—Silver.



Height 7⅝″, Width 4″, Depth 6⅜″

A—Style "DN-22B" D.C. Biased Neutral Relay
B—Style "DN-22BH" D.C. Biased Neutral High Release Relay (As Shown)

The Styles "DN-22B" and "DN-22BH" biased neutral relays offer important advantages over conventional neutral relays in many applications. In both relays the armature is magnetically biased (by means of a permanent magnet) so as to pick up in response to current of one polarity only. Both relays fully meet requirements of A. A. R. Signal Section Spec. 228-47.

Basic design principles of these relays are:

1. Relay will not pick up when permanent magnet is demagnetized.
2. Opening of the magnetic circuit when there is no energy on the coils cannot result in permanent magnet flux tending to pick up the armature.
3. Operating values will not be affected more than 2% after application of 50 times normal working value for two seconds, at either normal or reverse polarity.
4. Relay will not pick up with reverse polarity at 50 times the normal working value.

The Style "DN-22B" relay is particularly suitable for use as a biased neutral line relay, battery checking relay, and for other general applications.

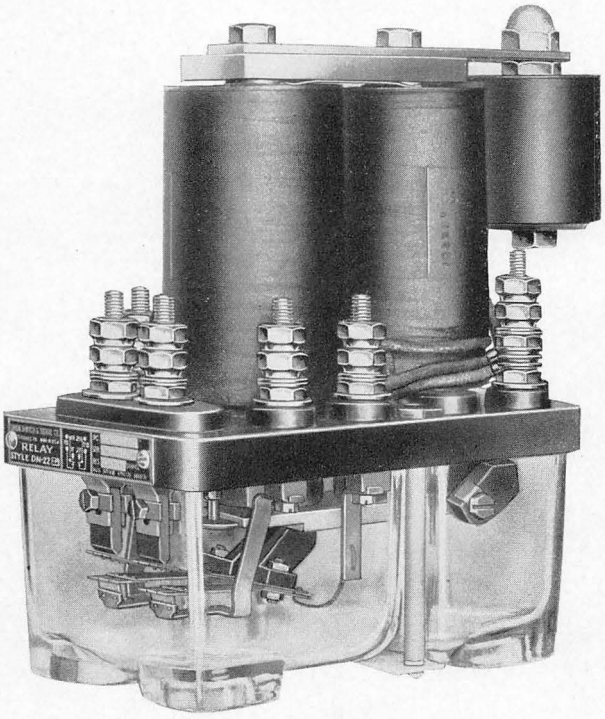
The Style "DN-22BH" high release relay is designed specifically for track circuit applications, and its exceptional operating characteristics not only provide increased safety but also make possible the use of longer steady energy d.c. track circuits than are practicable with previous standard d.c. relays.

Styles "DN-22B" D. C. Biased Neutral Relay And "DN-22BH" D. C. Biased Neutral High Release Relay

For details refer to Plate E-4980.
Relays are equipped with shock absorber bases and orders should specify whether wall or shelf type is desired.
Orders should specify resistance per pair of coils (See Ref. 8a, Plate E-5025).
Plug couplers for "DN-22B" and "DN-22BH" relays are shown on Plate E-5025-2, Ref. Aa.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Contact Combination	Contact Members		
			Front Post	Back Post	Spring
Style "DN-22B" D. C. Biased Neutral Relay, Coils..... Ohms per Pair. Dwg. C-9432-31					
	A	2F-2B Dependent (Low Voltage)	S.I.C.	S.	S.
Style "DN-22BH" Biased Neutral High Release Relay, Coils.....Ohms per Pair. Dwg. C-9432-32					
	B	2F-2B Dependent (Low Voltage)	S.I.C.	S.	S.
	Ba	2F-2B Dependent (Low Voltage)	S.I.C.	S.I.C.	S.
	Bb	2F-1B Independent (Low Voltage)	S.I.C.	S.	S.
		Note: Meanings of above abbreviations— S.I.C.—Silver Impregnated Carbon S.—Silver			



Height $8\frac{3}{16}''$, Width $4''$, Depth $8''$

Style "DN-22L" A.C.-D.C. Lightout Relay

The Style "DN-22L" Relay meets the demand for a relay to be used in series with differential double filament lamps.

This Relay is provided to operate on either A.C. or D.C. and is, therefore, suitable for A.C. installations where D.C. standby power is provided.

The Style "DN-22L" Relay consists of a Style "DN-22" Relay, similar to that shown on Plate E-4935, with special coils, and a rectifier mounted on a metal strap held in place by the bolts which fasten the backstrap to the cores. This rectifier is connected to the relay coil terminals. The relay is equipped with two front and two back low-voltage contacts. A tag is provided inside the relay listing the different lamps with which the relay may be used. The same relay may be used with any one of several different lamps.

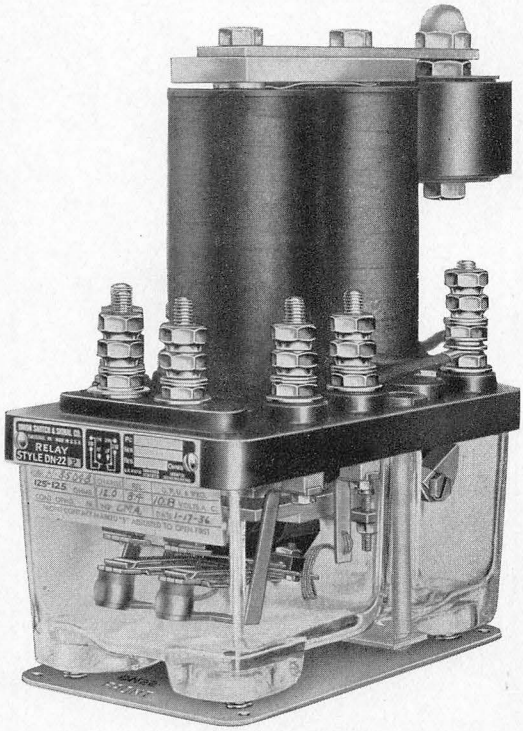
For additional information on "DN-22" relays refer to Plate E-4935.

Style "DN-22L" A.C.-D.C. Lightout Relay

For details refer to Plate E-4978. Shock Absorber Bases (Ref. 56, Plate E-4978) or Wall Mounting Brackets (Ref. 57, Plate E-4978) are not furnished unless called for. Orders should specify resistance per pair of Coils. (See Ref. 8a, Plate E-5025).

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
196626	**A**	**Style "DN-22L" A.C.-D.C. Lightout Relay, Magnet Coils 0.185-Ohm Per Pair,** with 2F and 2B dependent contacts (Contacts with silver to silver impregnated carbon front and silver to silver back). For use with any 8 or 10-Volt differential filament lamp where minor filament is rated at 3.5 Watts or with single filament lamps rated at 5 Watts. (If other lamps are to be used orders should so state).	C–9432–7
206447	**Aa**	**Style "DN-22L" A.C.-D.C. Lightout Relay, Magnet Coils 0.08-Ohm Per Pair,** with 2F and 2B dependent contacts (Contacts with silver to silver impregnated carbon front and silver to silver back). For use with any approach lighted 8 or 10-Volt differential filament lamp where minor filament is rated at 6 watts. (If other lamps are to be used orders should so state)	C–9432–7
206894	**Ab**	**Style "DN-22L" A.C.-D.C. Lightout Relay, Magnet Coils 0.08-Ohm Per Pair,** with 2F and 2B dependent contacts. (Contacts with silver to silver impregnated carbon front and silver to silver back). For use with any 8 or 10-Volt single filament lamps with ratings from 6 to 18 watts. (If other lamps are to be used orders should so state)	C–9432–7



Height $8\frac{9}{16}$″ (Shelf Type), $8\frac{7}{8}$″ (Wall Type), Width 4″, Depth 8″ (Shelf Type), $8\frac{9}{16}$″ (Wall Type)

Style "DN-22P" Power Transfer Relay

The Style "DN-22P" power transfer relay is a modification of the "DN-22" relay shown on Plate E-4935. A rectifier mounted on the backstrap is connected with the relay to provide operation from alternating current. The release value is 70% of the working value, so that lamps are transferred to the standby source with a reduction in line voltage, as well as when the line opens. Unless specified otherwise, one of the front contacts is adjusted for a stick circuit to take care of high voltage drop in the voltage source.

The relay is provided with low resistance silver to silver impregnated carbon contacts rated at 7.5 amperes each, front and back, or silver to silver contacts rated at 15 amperes each, front and back.

For other information on "DN-22" relays, see Plate E-4935.

Style "DN-22P" Power Transfer Relay

For details refer to Plate E-4985. Shelf Type Shock Absorber Base (Ref. 24, Plate E-4985) is furnished unless Wall Mounting Brackets (Ref. 25, Plate E-4985) are called for. Orders should specify normal A.C. Voltage of lamp circuit.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

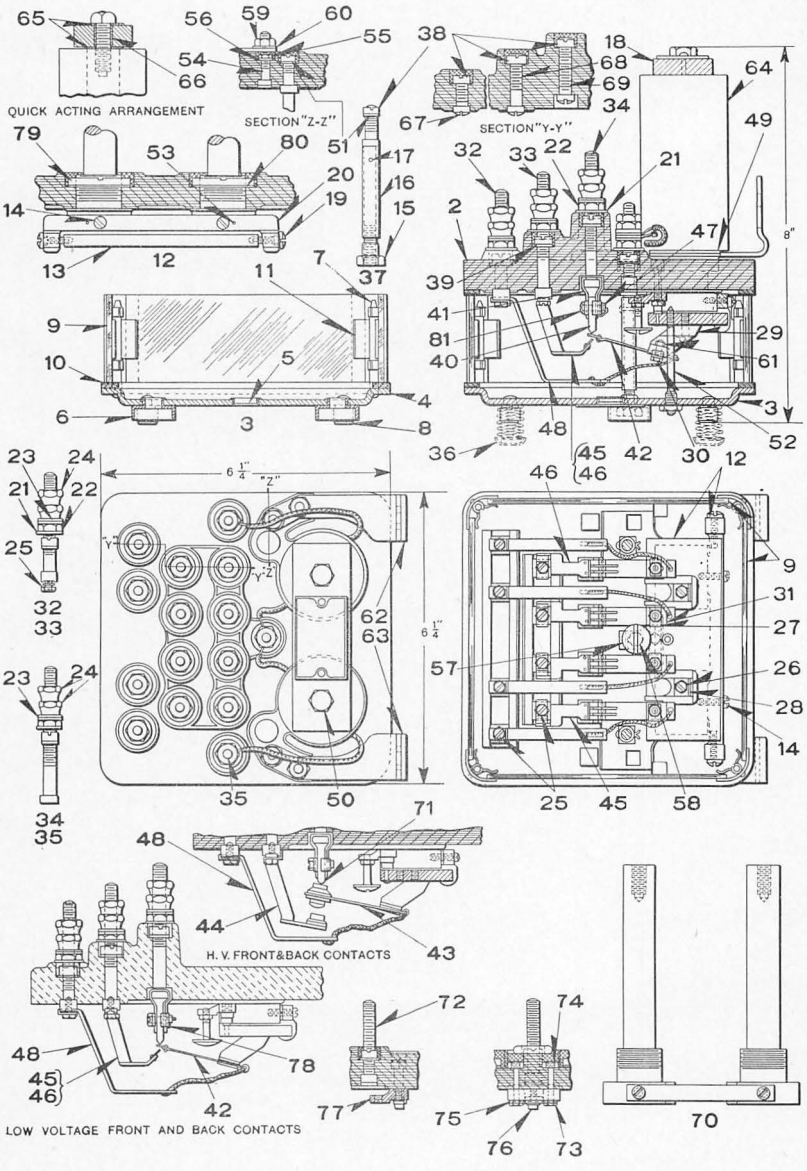
Style "DN-22P" Power Transfer Relay with Shelf Type Shock Absorber Base, for use on . . Voltage lamp circuit. (If Wall Mounting Brackets are desired orders should so state). Dwg. C-9432-6.

Piece	Ref.	Contact Combination	A.C. Volts	Contact Members			Coil Resistances Ohms
				Front Post	Back Post	Spring	
	A	2F-2B Dependent	8	S.I.C.	S.I.C.	S.	45–45
	Aa	2F-2B Dependent	8	S.	S.	S.	45–45
	Ab	2F-2B Dependent	10	S.I.C.	S.I.C.	S.	75–75
	Ac	2F-2B Dependent	10	S.	S.	S.	75–75
	Ad	2F-2B Dependent	12	S.I.C.	S.I.C.	S.	125–125
	Ae	2F-2B Dependent	12	S.	S.	S.	125–125

NOTE:—Meanings of above abbreviations—
S.I.C.—Silver Impregnated Carbon
S.—Silver.

PLATE E-4950

UNION SWITCH & SIGNAL CO.



DETAILS OF DN-11 D. C. NEUTRAL RELAY
(FOUR-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(FOUR-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
156889	**2**	**Top Plate, without Cores**	C–9078–13
149060	**3**	**Base, with Glass Shields and Gasket** (Inc. 1-3a, 4-9, 1-10 and 4-11)	C–9078–14
149013	**3a**	**Base, with Ventilator, Corner and Supporting Studs** (Inc. 1-4, 1-5, 2-6, 4-7 and 4-8)	10937–6
149012	**4**	**Base** only	10937–6
34340	**5**	**Ventilator**	C–7459–6
137927	**6**	**Collar**	8350–701
131216	**7**	**Corner Stud**	8114–632
131215	**8**	**Supporting Stud**	8114–631
142646	**9**	**Glass Shield (Side and End)**	8163–294
149034	**10**	**Gasket**	8078–1451
142653	**11**	**Shield Support**	10932–29
149211	**12**	**Armature, with Bracket and Trunnions** (Inc. 1-13, 2-19 and 1-20)	C–9078–7
149210	**13**	**Armature,** only for Ref. 12	8157–347
	14	**Machine Screw No. 8-36x½″** Fil. Hd. Br. (N. P.)	
138218	**15**	**Nut** for Ref. 37	8265–252
142632	**16**	**Bushing** for Ref. 37	8095–631
61151	**17**	**Pin** for Ref. 37	8097–837
142641	**18**	**Back Strap, with Name Plate**	8162–221
47579	**19**	**Trunnion** for Ref. 12	8378–197

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(FOUR-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
142639	**20**	**Bracket** for Ref. 12	8303–100
69705	**21**	**Washer**	7828–287
29103	**22**	**Nut**	8109–194
29102	**23**	**Washer**	7828–139
29101	**24**	**Nut**	8109–193
131239	**25**	**Screw** only for Refs. 32 and 33	8098–845
142673	**26**	**Screw** only for attaching Ref. 29 to Armature	8098–1300
134516	**27**	**Lock Washer** for Refs. 25 and 30	8486–368
149339	**28**	**Lock Washer** for Ref. 26	8486–368
150113	**29**	**Contact Spring Support**	9968–849
	30	**Screw with Nut and Lock Washer** (Inc. 1-30a, 1-27, and 1-61)	12471
150166	**30a**	**Screw** only for Ref. 30	8098–550
150140	**31**	**Lock Washer** for Contact Spring	8486–367
148205	**32**	**Terminal Post with Nuts, Washers and Screw** for Connector (Inc. 1-21, 1-22, 1-25, 1-27, 1-32a, 1-38, 1-39, 2-23 and 2-24)	12451–239
131234	**32a**	**Terminal Post** only for Ref. 32	8094–2125
	33	**Terminal Post with Nuts, Washers and Screw** for Back Contact (Inc. 1-21, 1-22, 1-25, 1-27, 1-33a, 1-38, 1-39, 2-23 and 2-24)	12451–239
142631	**33a**	**Terminal Post,** only for Ref. 33	8094–2125
148207	**34**	**Terminal Post with Nuts and Washers,** for Front Contact (Inc. 1-21, 1-22, 1-34a, 1-38, 1-39, 2-23 and 2-24)	12451–241

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
131237	**34a**	**Terminal Post** only, for Ref. 34	8094–1192
	35	**Terminal Post with Nuts and Washers,** for Magnet Lead (Inc. 1-21, 1-22, 1-35a, 1-38, 1-39, 2-23 and 2-24)	12451
130593	**35a**	**Terminal Post** only for Ref. 35	8094–1192
410218	**36**	**Shock Absorber Spring.**	
	37	**Center Screw with Bushing, Pin, Washer and Nuts** (Inc. 1-37a, 1-38, 1-51, 1-16, 1-17 and 1-15)	12451
142644	**37a**	**Center Screw** only	8098–1299
72948	**38**	**Nut** for Refs. 37, 67, 68, 69 and 72	8109–383
70539	**39**	**Washer**	8094–2122
131247	**40**	**Graphite Contact Tip** (For low voltage contacts)	8341–325
131245	**41**	**Front Terminal Post** only	8094–2122
150268	**42**	**Contact Spring** (Without Connector) Low Voltage Front and Back	8385–1996
145159	**43**	**Contact Spring** (Without Connector) High Voltage Front and Back	8385–2098
145310	**43a**	**Contact Spring** (Without Connector) High Voltage Front only	8385–2099
145164	**44**	**L. H. Back Post** (High Voltage)	8094–2190
145165	**44a**	**R. H. Back Post** (High Voltage)	8094–2190
131261	**45**	**L. H. Back Post** (Low Voltage)	8094–2123
131262	**46**	**R. H. Back Post** (Low Voltage)	8094–2123
131264	**47**	**Adjusting Nut**	8109–428

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
142643	**48**	**Connector**	8064–631
138576	**49**	**Gasket**	8078–1042
	50	**Cap Screw** $\frac{5}{16}$"**-18x**$\frac{3}{4}$" Hex. Hd. (Cad. Pl.) for attaching Back Strap to Magnet Cores.	
73772	**51**	**Washer** for Ref. 37	7826–180
142642	**52**	**Screw with Nut** Ref. 52b (Used for shipping)	8098–1298
137935	**52a**	**Screw** (Used in place of Ref. 52 when installed)	8098–1289
537	**52b**	**Nut,** used with Ref. 52	8109–1
57497	**53**	**Dowel** for Armature Bracket	8097–872
	54	**Terminal Post with Nut, Washer and Lock Washer** for Wall Brackets (Inc. 1-54a, 1-55, 1-56, 1-59 and 1-60)	12451
149152	**54a**	**Terminal Post** only for Ref. 54	8094–2205
9145	**55**	**Hex. Nut** for Ref. 54	8109–72
73129	**56**	**Washer** for Ref. 54	7826–180
	57	**Back Stop Screw with Nut and Lock Washer** (Inc. 1-57a, 1-28 and 1-58)	12471
149076	**57a**	**Back Stop Screw** only for Ref. 57	8098–549
29956	**58**	**Nut,** for Ref. 57	8109–202
26942	**59**	**Nut,** for Ref. 54	8109–184
	60	$\frac{3}{16}$" **Lock Washer** Pl. S. (Cad. Pl.) ($\frac{3}{32}$"x$\frac{1}{32}$") for Ref. 54.	
151836	**61**	**Nut** for Ref. 30	8109–445

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
148973	**62**	**L. H. Wall Bracket**	11893–404
148974	**63**	**R. H. Wall Bracket**	11893–404
	64	**Magnet Coil, complete with Leads and Terminals** (for details refer to Plate E-5025)	8133
145747	**65**	**Washer** (Used for quick acting Relay)	7828–218
25107	**66**	**Bushing** (Used for quick acting Relay)	C–7459–2
	67	**Screw with Nut** (Inc. 1-67a and 1-38)	12471
32680	**67a**	**Screw** only, for Ref. 67	8098–589
	68	**Screw with Nut** (Inc. 1-68a and 1-38)	12471
145417	**68a**	**Screw** only, for Ref. 68	8098–589
	69	**Machine Screw No. 14-24x1¼″** Fil. Hd. S. (Cad. Pl.) **with Nut** Ref. 38.	
156897	**70**	**Magnet Cores**	C–9078–6
145337	**71**	**Graphite Contact Tip** (For High Voltage Contacts)	8341–331
	72	**Terminal Post, with Nuts and Washers** for Magnet Lead (Inc. 1-72a, 1-39, 1-38, 1-21, 2-23 and 3-22)	12451
122782	**72a**	**Terminal Post** only, for Ref. 72	8094–1192
	73	**Screw, with Nut** (Inc. 1-73a and 1-74)	
149114	**73a**	**Screw** only, for Ref. 73	8098–1300
28166	**74**	**Nut** for Ref. 73	8109–192
150458	**75**	**Lock Washer** for Refs. 73 and 76	8486–382
	76	**Stud with Nut** (Inc. 1-76a and 1-74)	8114–677

PLATE E-4950

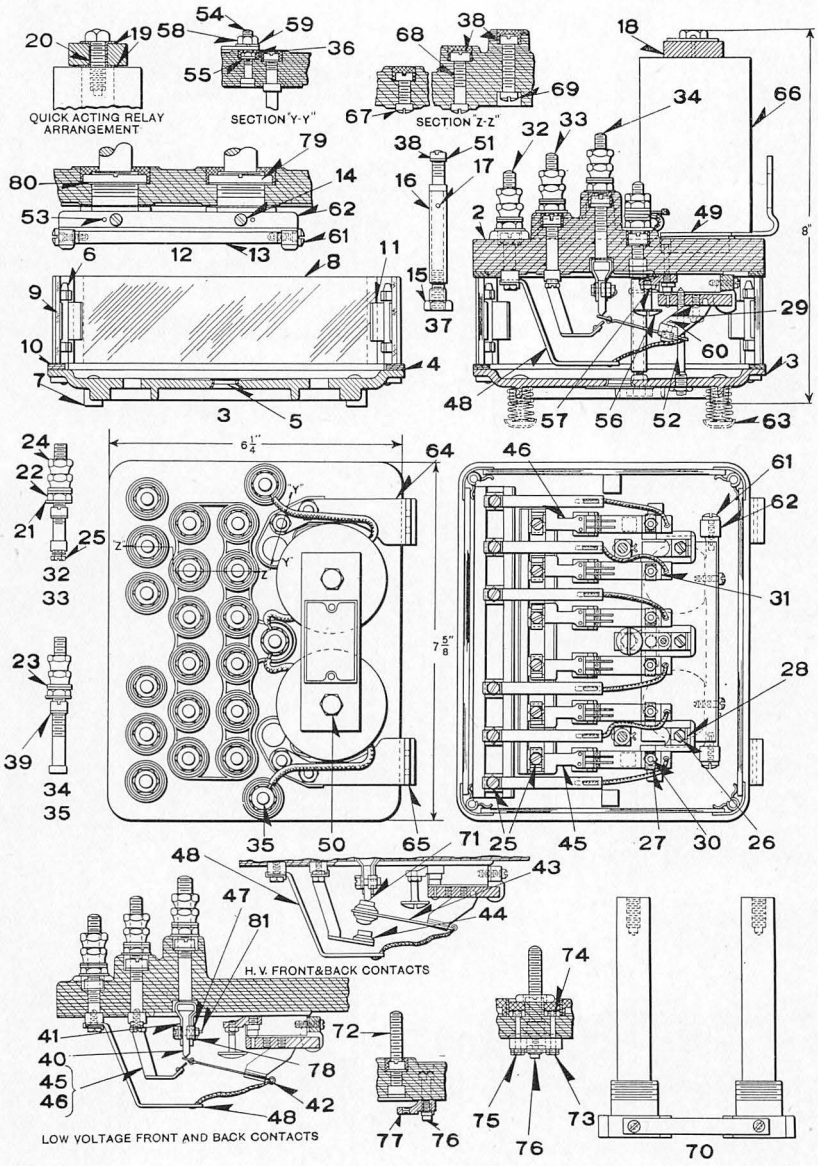
UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(FOUR-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
149075	**76a**	**Stud** only for Ref. 76	8114–677
149254	**77**	**Back Stop and Core Pin Bracket**	C–9078–5
134400	**78**	**Nut Lock** for Ref. 47	8486–371
131210	**79**	**Nut** for Ref. 70	8109–426
78416	**80**	**Washer** for Ref. 70	8274–99
57996	**81**	**Adjusting Screw**	8098–845

UNION SWITCH & SIGNAL COMPANY



DETAILS OF DN-11 D. C. NEUTRAL RELAY
(SIX-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(SIX-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
156887	**2**	**Top Plate, without Cores**	C–9078–9
142670	**3**	**Base, with Glass Shields and Gasket** (Inc. 1-3a, 2-8, 2-9, 1-10 and 4-11)	C–9078–6
142667	**3a**	**Base, with Ventilator, Corner and Supporting Studs** (Inc. 1-4, 1-5, 4-6 and 4-7)	C–9078–10
142666	**4**	**Base** only	C–9078–10
34340	**5**	**Ventilator**	C–7459–6
142633	**6**	**Corner Stud**	8114–632
145116	**7**	**Supporting Stud**	8114–631
142645	**8**	**Glass Shield (Side)**	8163–294
142646	**9**	**Glass Shield (End)**	8163–294
142636	**10**	**Gasket**	8078–1435
142653	**11**	**Shield Support**	10932–29
142654	**12**	**Armature, with Bracket and Trunnions** (Inc. 1-13, 2-61 and 1-62)	C–9078–7
142649	**13**	**Armature** only	8157–336
	14	**Machine Screw No. 8-36x½″** Fil. Hd. Br. (N. P.)	
138218	**15**	**Nut** for Ref. 37	8265–252
142632	**16**	**Bushing** for Ref. 37	8095–631
61151	**17**	**Pin** for Ref. 37	8097–837
142641	**18**	**Back Strap, with Name Plate**	8162–221
145747	**19**	**Washer** (Used for quick acting Relay)	7828–218
25107	**20**	**Bushing** (Used for quick acting Relay)	C–7459–2

PLATE E-4951

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(SIX-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
69705	**21**	**Washer**	7828–287
29103	**22**	**Nut**	8109–194
29102	**23**	**Washer**	7828–139
29101	**24**	**Nut**	8109–193
131239	**25**	**Screw** only for Refs. 32 and 33	8098–845
142673	**26**	**Screw** only for attaching Ref. 29 to Armature	8098–1300
134516	**27**	**Lock Washer** for Refs. 25 and 30	8486–368
149339	**28**	**Lock Washer** for Ref. 26	8486–368
150113	**29**	**Contact Spring Support**	9968–849
	30	**Screw with Nut and Lock Washer** (Inc. 1-30a, 1-27 and 1-60)	12471
150166	**30a**	**Screw** only for Ref. 30	8098–550
150140	**31**	**Lock Washer** for Contact Spring	8486–367
148205	**32**	**Terminal Post, with Nuts, Washers and Screw** for Connector (Inc. 1-21, 1-22, 1-25, 1-27, 1-32a, 1-38, 1-39, 2-23 and 2-24)	12451–239
131234	**32a**	**Terminal Post** only for Ref. 32	8094–2125
	33	**Terminal Post with Nuts, Washers and Screw** for Back Contact(Inc. 1-21, 1-22, 1-25, 1-27, 1-33a, 1-38, 1-39, 2-23 and 2-24)	12451–239
142631	**33a**	**Terminal Post,** only for Ref. 33	8094–2125
148207	**34**	**Terminal Post, with Nuts and Washers** for Front Contact (Inc. 1-21, 1-22, 1-34a, 1-38, 1-39, 2-23 and 2-24)	12451–241
131237	**34a**	**Terminal Post** only, for Ref. 34	8094–1192

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(SIX-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	35	**Terminal Post, with Nuts and Washers** for Magnet (Inc. 1-21, 1-22, 1-35a, 1-38, 1-39, 2-23 and 2-24)	12451–241
130593	**35a**	**Terminal Post** only for Ref. 35	8094–1192
9145	**36**	**Hex. Nut** for Ref. 54	8109–72
	37	**Center Screw with Bushing, Pin, Washer and Nuts** (Inc. 1-37a, 1-38, 1-51, 1-16, 1-17 and 1-15)	12471
142644	**37a**	**Center Screw** only	8098–1299
72948	**38**	**Nut** for Refs. 37, 67, 68, 69 and 72	8109–383
70539	**39**	**Washer**	8094–2122
131247	**40**	**Graphite Contact Tip** (For Low Voltage Contacts)	8341–325
131245	**41**	**Front Terminal Post** only	8094–2122
150268	**42**	**Contact Spring** (Without Connector) Low Voltage Front and Back	8385–1996
145159	**43**	**Contact Spring** (Without Connector) High Voltage Front and Back	8385–2098
145310	**43a**	**Contact Spring** (Without Connector) High Voltage Front only	8385–2099
145164	**44**	**L. H. Back Post** (High Voltage)	8094–2190
145165	**44a**	**R. H. Back Post** (High Voltage)	8094–2190
131261	**45**	**L. H. Back Post** (Low Voltage)	8094–2123
131262	**46**	**R. H. Back Post** (Low Voltage)	8094–2123
131264	**47**	**Adjusting Nut**	8109–428
142643	**48**	**Connector**	8064–631
138576	**49**	**Gasket**	8078–1042

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(SIX-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	50	**Cap Screw** $\frac{5}{16}$"-18x$\frac{3}{4}$" Hex. Hd. (Cad. Pl.) for attaching Back Strap to magnet cores.	
73772	**51**	**Washer** for Ref. 37	7826–180
142642	**52**	**Screw, with Nut Ref. 52b** (Used for shipping)	8098–1298
137935	**52a**	**Screw,** (Used in place of Ref. 52 when installed)	8098–1289
537	**52b**	**Nut,** used with Ref. 52	8109–1
57497	**53**	**Dowel** for Armature Bracket	8097–872
	54	**Terminal Post with Nut, Washer and Lock Washer,** for Wall Brackets (Inc. 1-54a, 1-36, 1-55, 1-58 and 1-59)	12451
149152	**54a**	**Terminal Post** only, for Ref. 54	8094–2205
73129	**55**	**Washer** for Ref. 54	7826–180
	56	**Back Stop Screw with Nut and Lock Washer** (Inc. 1-56a, 1-28 and 1-57)	12471
149076	**56a**	**Back Stop Screw,** only for Ref. 56	8098–549
29956	**57**	**Nut,** for Ref. 56	8109–202
26942	**58**	**Nut,** for Ref. 54	8109–184
	59	$\frac{3}{16}$" **Lock Washer Pl. S. (Cad. Pl.)** ($\frac{3}{32}$"x$\frac{1}{32}$") for Ref. 54.	
151836	**60**	**Nut** for Ref. 30	8109–445
47579	**61**	**Trunnion** for Ref. 12	8378–197
142639	**62**	**Bracket** for Ref. 12	8303–100
410218	**63**	**Shock Absorber Spring.**	

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(SIX-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
148973	**64**	**L. H. Wall Bracket**	11893–404
148974	**65**	**R. H. Wall Bracket**	11893–404
	66	**Magnet Coil complete, with Leads and Terminals** (for details refer to Plate E-5025)	8133
	67	**Screw with Nut** (Inc. 1-67a and 1-38)	12471
32680	**67a**	**Screw** only, for Ref. 67	8098–589
	68	**Screw with Nut** (Inc. 1-68a and 1-38)	12471
145417	**68a**	**Screw** only, for Ref. 68	8098–589
	69	**Machine Screw No. 14-24x1¼″** Fil. Hd. S. (Cad. Pl.) with Nut Ref. 38.	
156897	**70**	**Magnet Cores**	C–9078–6
145337	**71**	**Graphite Contact Tip** (For high voltage contacts)	8341–331
	72	**Terminal Post, with Nuts and Washers for Magnet Lead** (Inc. 1-72a, 1-39, 1-38, 1-21, 2-23 and 3-22)	12451
122782	**72a**	**Terminal Post** only, for Ref. 72	8094–1192
	73	**Screw with Nut** (Inc. 1-73a and 1-74)	
149114	**73a**	**Screw** only, for Ref. 73	8098–1300
28166	**74**	**Nut** for Ref. 73	8109–192
150458	**75**	**Lock Washer** for Refs. 73 and 76	8486–382
	76	**Stud with Nut** (Inc. 1-76a and 1-74)	8114–677
149075	**76a**	**Stud** only, for Ref. 76	8114–677
149254	**77**	**Back Stop and Core Pin Bracket**	C–9078–5

PLATE E-4951

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(SIX-POINT)

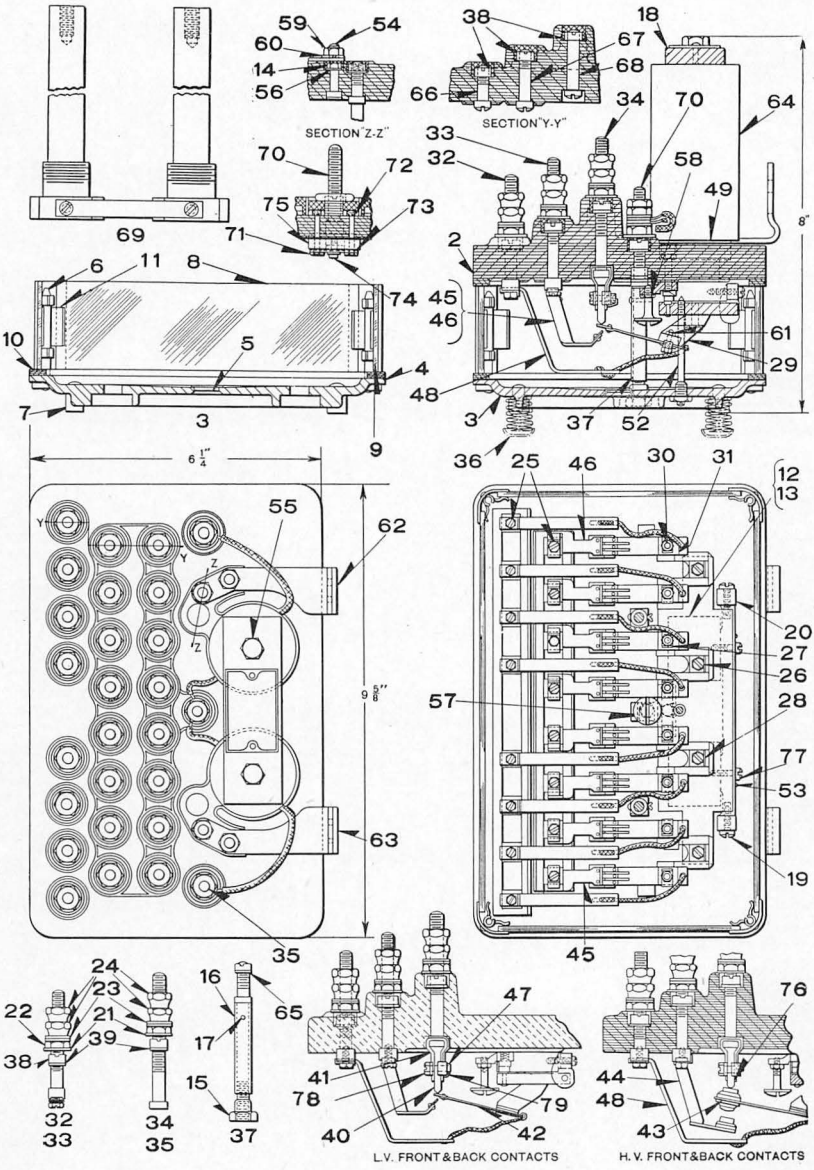
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
134400	**78**	**Nut Lock** for Ref. 47	8486–371
131210	**79**	**Nut** for Ref. 70	8109–426
78416	**80**	**Washer** for Ref. 70	8274–99
57996	**81**	**Adjusting Screw**	8098–845

PLATE E-4952

UNION SWITCH & SIGNAL COMPANY



DETAILS OF DN-11 D. C. NEUTRAL RELAY
(EIGHT-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(EIGHT-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
156886	**2**	**Top Plate, without Cores**	C–9078–8
142671	**3**	**Base, with Glass Shields and Gasket** (Inc. 1-3a, 2-8, 2-9, 1-10 and 4-11)	C–9078–6
142669	**3a**	**Base, with Ventilator, Corner and Supporting Studs** (Inc. 1-4, 1-5, 4-7 and 4-8)	C–9078–10
142668	**4**	**Base** only	C–9078–10
34340	**5**	**Ventilator**	C–7459–6
142633	**6**	**Corner Stud**	8114–632
145116	**7**	**Supporting Stud**	8114–631
142647	**8**	**Glass Shield (Side)**	8163–294
142646	**9**	**Glass Shield (End)**	8163–294
142638	**10**	**Gasket**	8078–1436
142653	**11**	**Shield Support**	10932–29
155487	**12**	**Armature, with Bracket and Trunnions** (Inc. 1-13, 2-19 and 1-20)	C–9078–7
155808	**13**	**Armature,** only for Ref. 12	8157–361
9145	**14**	**Hex. Nut** for Ref. 54	8109–72
138218	**15**	**Nut** for Ref. 37	8265–252
142632	**16**	**Bushing** for Ref. 37	8095–631
61151	**17**	**Pin** for Ref. 37	8097–837
142641	**18**	**Back Strap, with Name Plate**	8162–221
47529	**19**	**Trunnion** for Ref. 12	8378–197

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(EIGHT-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
142639	**20**	**Bracket** for Ref. 12	8303–100
69705	**21**	**Washer**	7828–287
29103	**22**	**Nut**	8109–194
29102	**23**	**Washer**	7828–139
29101	**24**	**Nut**	8109–193
131239	**25**	**Screw** only for Refs. 32 and 33	8098–845
142673	**26**	**Screw** only for attaching Ref. 29 to Armature	8098–1300
134516	**27**	**Lock Washer** for Refs. 25 and 30	8486–368
149339	**28**	**Lock Washer** for Ref. 26	8486–368
150113	**29**	**Contact Spring Support**	9968–849
	30	**Screw with Nut and Lock Washer** (Inc. 1-30a, 1-27 and 1-61)	12471
150166	**30a**	**Screw** only for Ref. 30	8098–550
150140	**31**	**Lock Washer** for Contact Spring	8486–367
148205	**32**	**Terminal Post with Nuts, Washers and Screw** for Connector (Inc. 1-21, 1-22, 1-25, 1-27, 1-32a, 1-38, 1-39, 2-23 and 2-24)	12451–239
131234	**32a**	**Terminal Post** only for Ref. 32	8094–2125
	33	**Terminal Post, with Nuts, Washers and Screw** for Back Contact (Inc. 1-21, 1-22, 1-25, 1-27, 1-33a, 1-38, 1-39, 2-23 and 2-24)	12451–239
142631	**33a**	**Terminal Post,** only for Ref. 33	8094–2125
148207	**34**	**Terminal Post, with Nuts and Washers** for Front Contact (Inc. 1-21, 1-22, 1-34a, 1-38, 1-39, 2-23 and 2-24)	12451–241

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(EIGHT-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
131237	**34a**	**Terminal Post,** only for Ref. 34	8094–1192
	35	**Terminal Post, with Nuts and Washers** for Magnet Lead (Inc. 1-21, 1-22, 1-35a, 1-38, 1-39, 2-23 and 2-24)	12451
130593	**35a**	**Terminal Post,** only for Ref. 35	8094–1192
410218	**36**	**Shock Absorber Spring.**	
	37	**Center Screw with Bushing, Pin, Washer and Nuts** (Inc. 1-37a, 1-38, 1-65, 1-16, 1-17 and 1-15)	12471
142644	**37a**	**Center Screw** only for Ref. 37	8098–1299
72948	**38**	**Nut** for Refs. 37, 66, 67, 68 and 70	8109–383
70539	**39**	**Washer**	8094–2122
131247	**40**	**Graphite Contact Tip** for Low Voltage Contacts	8341–325
131245	**41**	**Front Terminal Post** only	8094–2122
150268	**42**	**Contact Spring** (Without Connector) Low Voltage Front and Back	8385–1996
145159	**43**	**Contact Spring** (Without Connector) High Voltage Front and Back	8385–2098
145310	**43a**	**Contact Spring** (Without Connector) High Voltage Front only	8385–2099
145164	**44**	**L. H. Back Post** (High Voltage)	8094–2190
145165	**44a**	**R. H. Back Post** (High Voltage)	8094–2190
131261	**45**	**L. H. Back Post** (Low Voltage)	8094–2123
131262	**46**	**R. H. Back Post** (Low Voltage)	8094–2123
131264	**47**	**Adjusting Nut**	8109–428

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(EIGHT-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
142643	**48**	**Connector**	8064–631
138576	**49**	**Gasket**	8078–1042
78416	**50**	**Washer** for Ref. 69 (Not shown)	8274–99
131210	**51**	**Nut** for Ref. 69 (Not shown)	8109–426
142642	**52**	**Screw, with Nut** Ref. 52b (Used for shipping)	8098–1298
137935	**52a**	**Screw,** (Used in place of Ref. 52 when installed)	8098–1289
537	**52b**	**Nut,** used with Ref. 52	8109–1
57497	**53**	**Dowel** for Armature Bracket	8097–872
	54	**Terminal Post, with Nut and Lock Washer, for Wall Brackets** (Inc. 1-14, 1-54a, 1-56, 1-59 and 1-60)	12451
149152	**54a**	**Terminal Post,** only for Ref. 54	8094–2205
	55	**Cap Screw,** $\frac{5}{16}$"**-18x**$\frac{3}{4}$" Hex. Hd. for attaching Back Straps to Magnet Cores.	
73129	**56**	**Washer** for Ref. 54	7826–180
	57	**Back Stop Screw with Nut and Lock Washer** (Inc. 1-57a, 1-28 and 1-58)	12471
149076	**57a**	**Back Stop Screw** only, for Ref. 57	8098–549
29956	**58**	**Nut,** for Ref. 57	8109–202
26942	**59**	**Nut** for Ref. 54	8109–184
	60	$\frac{3}{16}$" **Lock Washer Pl. S.** ($\frac{3}{32}$"x$\frac{1}{32}$") for Ref. 54.	
151836	**61**	**Nut** for Ref. 30	8109–445
148973	**62**	**L. H. Wall Bracket**	11893–404
148974	**63**	**R. H. Wall Bracket**	11893–404

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY
(EIGHT-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	64	**Magnet Coil complete, with Leads and Terminals** (for details refer to Plate E-5025)	8133
73772	**65**	**Washer** for Ref. 37	7826–180
	66	**Screw with Nut** (Includes 1-66a and 1-38)	12471
32680	**66a**	**Screw** only for Ref. 66	8098–589
	67	**Screw with Nut** (Includes 1-67a and 1-38)	12471
145417	**67a**	**Screw** only for Ref. 67	8098–589
	68	**Machine Screw No. 14-24x1¼″** Fil. Hd. S. (Cad. Pl.) with Nut Ref. 38.	
156897	**69**	**Magnet Cores**	C–9078–6
	70	**Terminal Post with Nuts and Washers** for Magnet Lead (Inc. 1-70a, 1-39, 1-38, 1-21, 3-22 and 2-23)	12451
122782	**70a**	**Terminal Post** only, for Ref. 20	8094–1192
	71	**Screw with Nut** (Inc. 1-71a and 1-72)	
149114	**71a**	**Screw** only, for Ref. 71	8098–1300
28166	**72**	**Nut** for Ref. 71	8109–192
150458	**73**	**Lock Washer** for Refs. 71 and 74	8486–382
	74	**Stud with Nut** (Inc. 1-74a and 1-72)	8114–677
149075	**74a**	**Stud** only for Ref. 74	8114–677
149254	**75**	**Back Stop and Core Pin Bracket**	C–9078–5
145337	**76**	**Graphite Contact Tip** (For high voltage contacts)	8341–331

UNION SWITCH & SIGNAL COMPANY

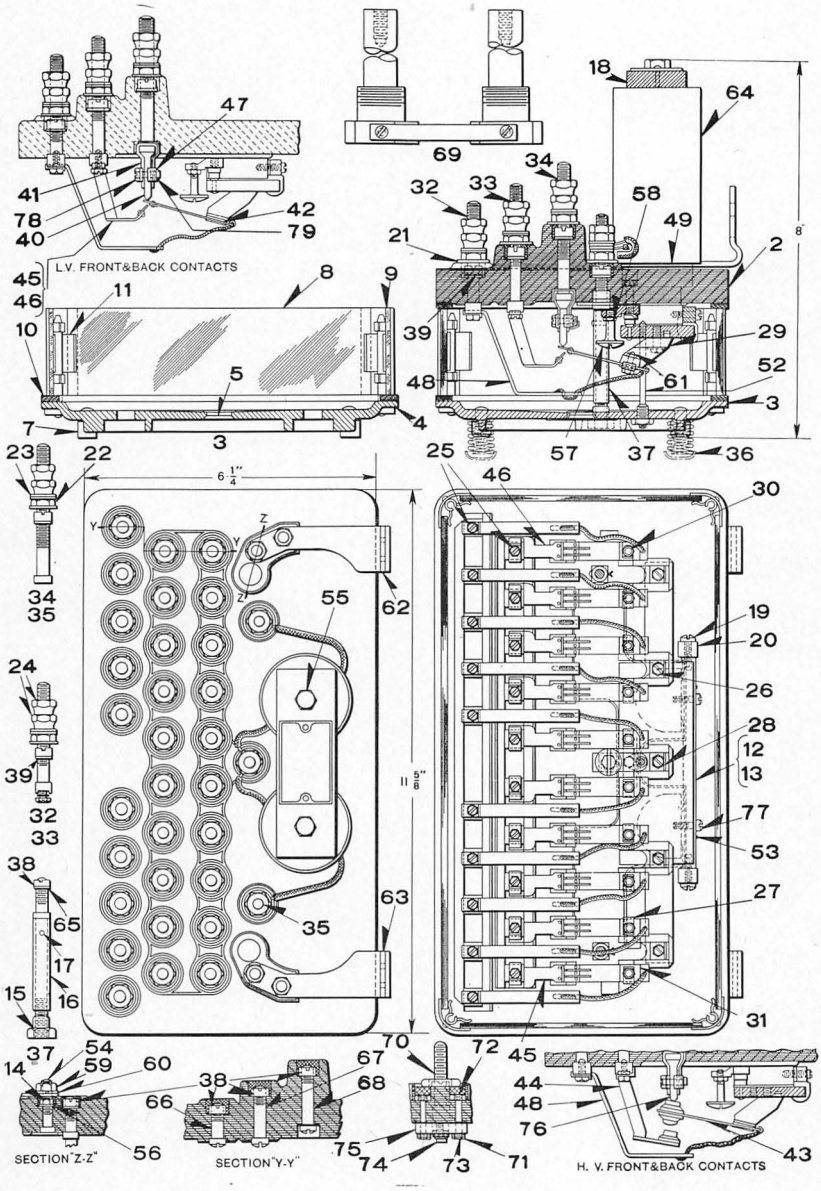
DETAILS OF DN-11 D. C. NEUTRAL RELAY
(EIGHT-POINT)
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	77	**Machine Screw No. 8-36x½″ Fil. Hd. Br.** (N. P.)	
57996	**78**	**Adjusting Screw**	8098–845
134400	**79**	**Nut Lock** for Ref. 47	8486–371

PLATE E-4953

UNION SWITCH & SIGNAL COMPANY



DETAILS OF DN-11 D. C. NEUTRAL RELAY
(TEN-POINT)

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(TEN-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
156888	**2**	**Top Plate, without Cores**	C–9078–11
145912	**3**	**Base, with Glass Shields and Gasket** (Inc. 1-3a, 2-8, 2-9, 1-10 and 4-11)	C–9078–6
145914	**3a**	**Base, with Ventilator, Corner and Supporting Studs** (Inc. 1-4, 1-5, 4-6 and 4-7)	C–9078–12
145913	**4**	**Base** only	C–9078–12
34340	**5**	**Ventilator**	C–7459–6
142633	**6**	**Corner Stud**	8114–632
145116	**7**	**Supporting Stud**	8114–631
145941	**8**	**Glass Shield (Side)**	8163–294
142646	**9**	**Glass Shield (End)**	8163–294
145943	**10**	**Gasket**	8078–1436
142653	**11**	**Shield Support**	10932–29
156802	**12**	**Armature, with Bracket and Trunnions** (Inc. 1-13, 2-19 and 1-20)	C–9078–7
156820	**13**	**Armature,** only for Ref. 12	8157–365
9145	**14**	**Hex. Nut** for Ref. 37	8109–72
138218	**15**	**Nut** for Ref. 37	8265–252
142632	**16**	**Bushing** for Ref. 37	8095–631
61151	**17**	**Pin** for Ref. 37	8097–837
142641	**18**	**Back Strap, with Name Plate**	8162–221
47529	**19**	**Trunnion** for Ref. 12	8378–197
142639	**20**	**Bracket** for Ref. 12	8303–100

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(TEN-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
69705	**21**	**Washer**	7828–287
29103	**22**	**Nut**	8109–194
29102	**23**	**Washer**	7828–139
29101	**24**	**Nut**	8109–193
131239	**25**	**Screw** only for Refs. 32 and 33	8098–845
142673	**26**	**Screw** only for attaching Ref. 29 to Armature	8098–1300
134516	**27**	**Lock Washer** for Refs. 25 and 30	8486–368
149339	**28**	**Lock Washer**	8486–368
150113	**29**	**Contact Spring Support**	9968–849
	30	**Screw with Nut and Lock Washer** (Inc. 1-30a, 1-27 and 1-61)	12471
150166	**30a**	**Screw** only for Ref. 30	8098–550
150140	**31**	**Lock Washer** for Contact Spring	8486–367
148205	**32**	**Terminal Post, with Nuts, Washers and Screw,** for Connector (Inc. 1-21, 1-22, 1-25, 1-27, 1-32a, 1-38, 1-39, 2-23 and 2-24)	12451–239
131234	**32a**	**Terminal Post** only for Ref. 32	8094–2125
	33	**Terminal Post, with Nuts, Washers and Screw,** for Back Contact (Inc. 1-21, 1-22, 1-25, 1-27, 1-33a, 1-38, 1-39, 2-23 and 2-24)	12451–239
142631	**33a**	**Terminal Post,** only for Ref. 33	8094–2125
148207	**34**	**Terminal Post, with Nuts and Washers** for Front Contact (Inc. 1-21, 1-22, 1-34a, 1-38, 1-39, 2-23 and 2-24)	12451–241

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(TEN-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
131237	**34a**	**Terminal Post,** only for Ref. 34	8094–1192
	35	**Terminal Post, with Nuts and Washers** for Magnet (Inc. 1-21, 1-22, 1-35a, 1-38, 1-39, 2-23 and 2-24)	12451
130593	**35a**	**Terminal Post,** only for Ref. 35	8094–1192
410218	**36**	**Shock Absorber Spring.**	
	37	**Center Screw with Bushing, Pin, Washer, and Nuts** (Inc. 1-37a, 1-38, 1-65, 1-16, 1-17 and 1-15)	12471
142644	**37a**	**Center Post** only for Ref. 37	8098–1299
72948	**38**	**Nut** for Ref. 37	8109–383
70539	**39**	**Washer**	8094–2122
131247	**40**	**Graphite Contact Tip** (For Low Voltage Contacts)	8341–325
131245	**41**	**Front Terminal Post** only	8094–2122
150268	**42**	**Contact Spring** (Without Connector) Low Voltage Front and Back	8385–1996
145159	**43**	**Contact Spring** (Without Connector) High Voltage Front and Back	8385–2098
145310	**43a**	**Contact Spring** (Without Connector) High Voltage Front only	8385–2099
145164	**44**	**L. H. Back Post** (High Voltage)	8094–2190
145165	**44a**	**R. H. Back Post** (High Voltage)	8094–2190
131261	**45**	**L. H. Back Post** (Low Voltage)	8094–2123
131262	**46**	**R. H. Back Post** (Low Voltage)	8094–2123
131264	**47**	**Adjusting Nut**	8109–428
142643	**48**	**Connector**	8064–631

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(TEN-POINT)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
138576	**49**	**Gasket**	8078–1042
78416	**50**	**Washer** for Ref. 69 (Not shown)	8274–99
131210	**51**	**Nut** for Ref. 69 (Not shown)	8109–426
142642	**52**	**Screw, with Nut** Ref. 52b (Used for shipping)	8098–1298
137935	**52a**	**Screw** (Used in place of Ref. 52 when installed)	8098–1289
537	**52b**	**Nut,** used with Ref. 52	8109–1
57497	**53**	**Dowel** for Armature Bracket	8097–872
	54	**Terminal Post, with Nut and Lock Washer,** for Wall Brackets (Inc. 1-14, 1-54a, 1-56, 1-59 and 1-60)	12451
149152	**54a**	**Terminal Post,** only for Ref. 54	8094–2205
	55	**Cap Screw,** $\frac{5}{16}$"**-18x**$\frac{3}{4}$" Hex. Hd. for attaching Back Straps to Magnet Cores.	
73129	**56**	**Washer** for Ref. 54	7826–180
149076	**57**	**Back Stop Screw**	8098–549
29956	**58**	**Nut,** for Ref. 57	8109–202
26942	**59**	**Nut** for Ref. 54	8109–184
	60	$\frac{3}{16}$" **Lock Washer Pl. S.** ($\frac{3}{32}$"x$\frac{1}{32}$") for Ref. 54.	
151836	**61**	**Nut** for Ref. 30	8109–445
148973	**62**	**L. H. Wall Bracket**	11893–404
148974	**63**	**R. H. Wall Bracket**	11893–404
	64	**Magnet Coil complete, with Leads and Terminals** (for details refer to Plate E-5025)	8133
73772	**65**	**Washer** for Ref. 37	7826–180

UNION SWITCH & SIGNAL COMPANY

DETAILS OF DN-11 D. C. NEUTRAL RELAY

(TEN-POINT)

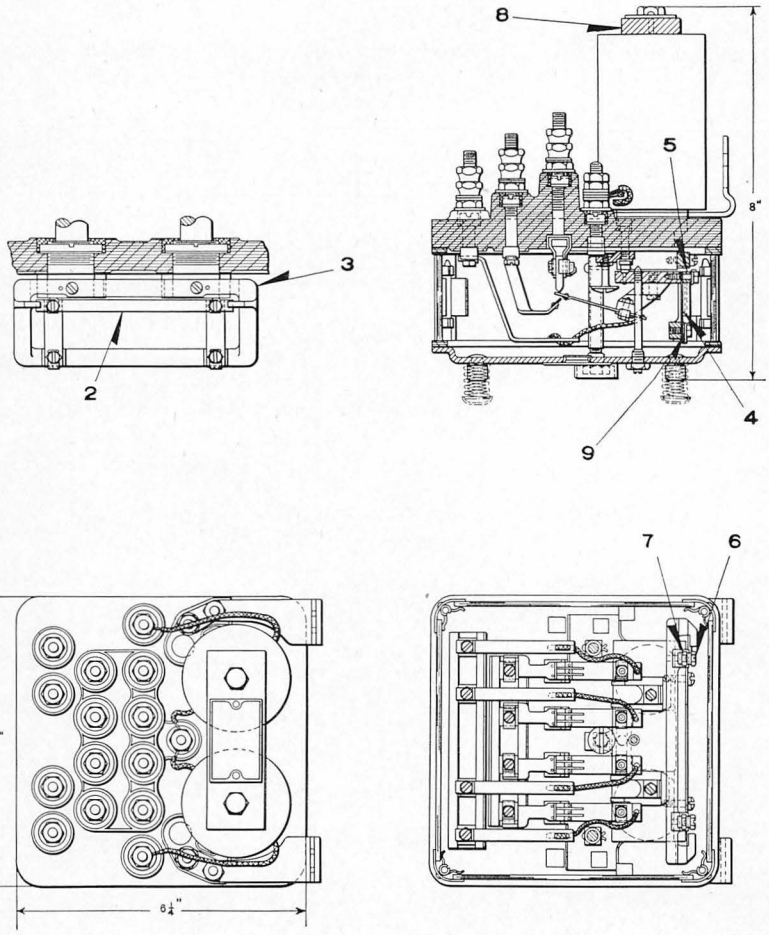
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	66	**Screw with Nut** (Inc. 1-66a and 1-38)	12471
32680	**66a**	**Screw** only for Ref. 66	8098–589
	67	**Screw with Nut** (Includes 1-67a and 1-38)	12471
145417	**67a**	**Screw** only for Ref. 67	8098–589
	68	**Machine Screw No. 14-24x1¼″ Fil. Hd. S.** (Cad. Pl.) **with Nut** Ref. 38.	
156897	**69**	**Magnet Cores**	C–9078–6
	70	**Terminal Post with Nuts and Washers** for Magnet Leads (Inc. 1-70a, 1-39, 1-38, 1-21, 3-22 and 2-23)	12451
122782	**70a**	**Terminal Post** only, for Ref. 70	8094–1192
	71	**Screw with Nut** (Inc. 1-71a and 1-72)	
149114	**71a**	**Screw** only for Ref. 71	8098–1300
28166	**72**	**Nut** for Ref. 71	8109–192
150458	**73**	**Lock Washer** for Refs. 71 and 74	8486–382
	74	**Stud with Nut** (Inc. 1-74a and 1-72)	8114–677
149075	**74a**	**Stud** only for Ref. 74	8114–677
149254	**75**	**Back Stop and Core Pin Bracket**	C–9078–5
145337	**76**	**Graphite Contact Tip** (For high voltage contacts)	8341–331
	77	**Machine Screw No. 8-36x½″ Fil. Hd. Br.** (N. P.).	
57996	**78**	**Adjusting Screw**	8098–845
134400	**79**	**Nut Lock** for Ref. 47	8486–371

PLATE E-4954

UNION SWITCH & SIGNAL COMPANY



FOR OTHER DETAILS REFER TO PLATE E-4950

DETAILS OF "DN-12" D. C. TRUNNIONLESS NEUTRAL RELAY (FOUR-POINT)

UNION SWITCH & SIGNAL COMPANY

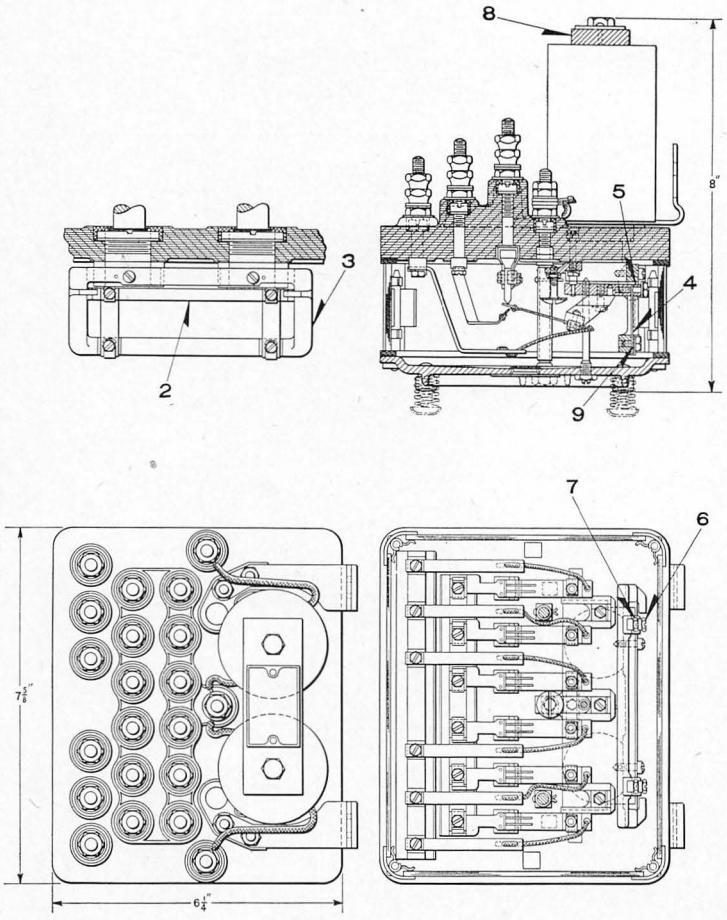
DETAILS OF "DN-12" D. C. TRUNNIONLESS NEUTRAL RELAY (FOUR-POINT)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
152810	**2**	**Armature,** only	8157–353
149977	**3**	**Armature Bracket**	8303–103
152710	**4**	**Armature Supporting Spring**	8735–667
152834	**5**	**Locking Piece**	12538–29
152807	**6**	**Screw** for fastening Ref. 2 to 4	8098–554
62997	**7**	**Screw** for fastening Ref. 4 to 3	8098–845
152849	**8**	**Back Strap**	8162–221
5511	**9**	**Washer** for Ref. 7	7828–2
		For other Details refer to Plate E-4950.	

PLATE E-4955

UNION SWITCH & SIGNAL COMPANY



FOR OTHER DETAILS REFER
TO PLATE E-4951

DETAILS OF "DN-12" D. C. TRUNNIONLESS NEUTRAL RELAY
(SIX-POINT)

UNION SWITCH & SIGNAL CO.

DETAILS OF "DN-12" D. C. TRUNNIONLESS NEUTRAL RELAY (SIX-POINT)

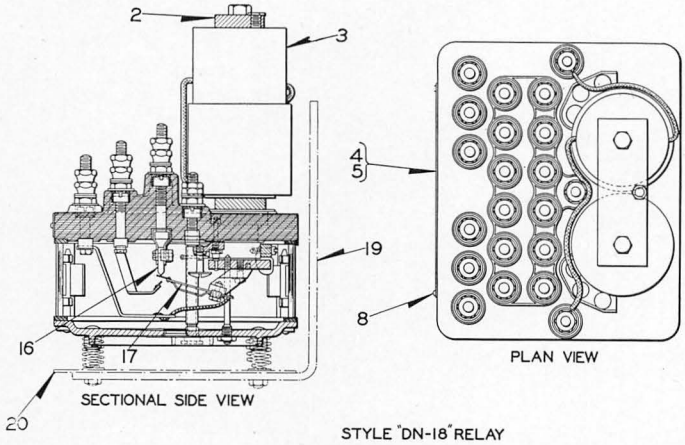
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
152859	**2**	**Armature,** only	8157–356
149977	**3**	**Armature Bracket**	8303–103
152710	**4**	**Armature Supporting Spring**	8735–667
152834	**5**	**Locking Piece**	12538–29
152807	**6**	Screw for fastening Ref. 2 to 4	8098–554
62997	**7**	Screw for fastening Ref. 4 to 3	8098–845
152849	**8**	**Back Strap**	8162–221
5511	**9**	Washer for Ref. 7	7828–2
		For other Details refer to Plate E-4951.	

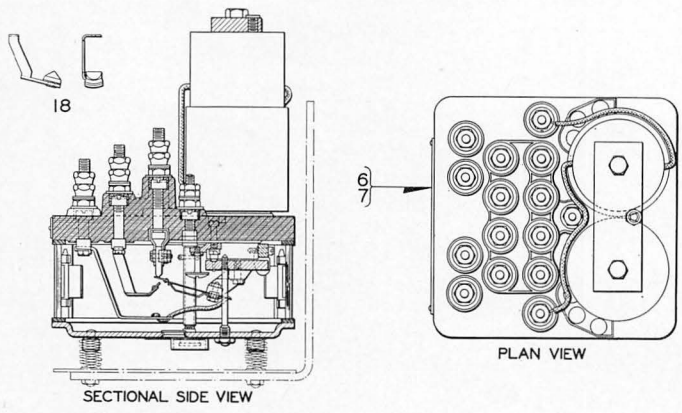
Insert in place of same sheet dated 4-29

PLATE E-4975

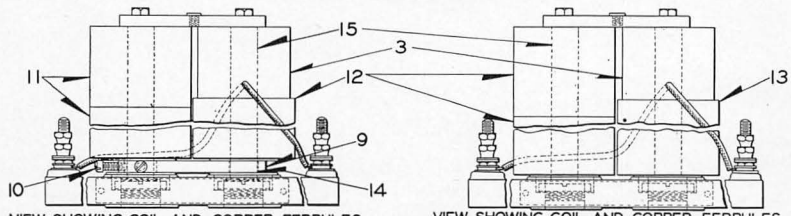
UNION SWITCH & SIGNAL CO.



STYLE "DN-18" RELAY



STYLE "DN-19" RELAY



VIEW SHOWING COIL AND COPPER FERRULES STYLE "DN-18" RELAY

VIEW SHOWING COIL AND COPPER FERRULES STYLE "DN-19" RELAY

DETAILS OF STYLE "DN-18" AND "DN-19" NEUTRAL RELAYS

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DN-18" AND "DN-19" NEUTRAL RELAYS (FOUR AND SIX POINT)

For all other details refer to Plates E-4950 or E-4951, depending on whether part is for four or six point relay

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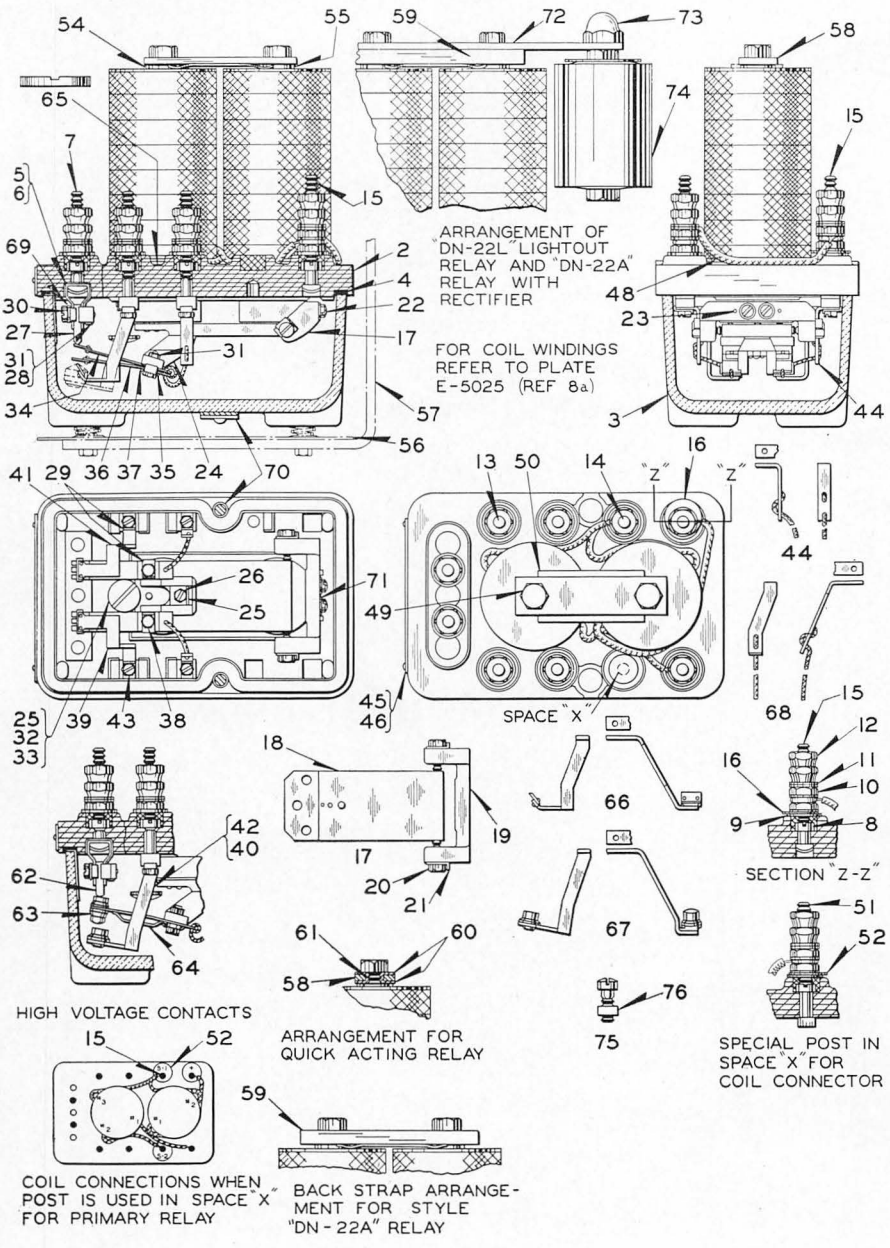
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
142640	**2**	**Back Strap** for "DN-18" and "DN-19" Relays	8162–221
174007	**3**	**Magnet,** 225-Ohms	8133–410
173786	**3a**	**Magnet,** 350-Ohms	8133–410
174156	**3b**	**Magnet,** 500-Ohms	8133–410
177479	**4**	**Name Plate** for "DN-18" Six Point Relay	8225–408
177480	**5**	**Name Plate** for "DN-18" Four Point Relay	8225–409
181489	**6**	**Name Plate** for "DN-19" Four Point Relay	8225–435
181488	**7**	**Name Plate** for "DN-19" Six Point Relay	8225–434
	8	**Screw, No. 4x1/4″** Rd. Hd. (N.P.) for attaching Name Plate to Top Plate.	
173788	**9**	**Magnet Shunt** for "DN-18" Relays	8162–243
	10	**Machine Screw, No. 10-30x5/8″** Fil. Hd. Br. (N.P.).	
176802	**11**	**Copper Tubing** for "DN-18" Relays	8350–785
176803	**12**	**Copper Tubing** for "DN-18" and "DN-19" Relays	8350–785
179496	**13**	**Copper Tubing** for "DN-19" Relays	8350–785
178601	**14**	**Bushing** for "DN-18" Relays	11893–641
174158	**15**	**Core**	8101–333
158043	**16**	**Contact Tip** (Silver Imp. Carbon)	8341–476
170726	**17**	**Contact Spring** with flexible connector	8385–1996
157395	**18**	**R. H. Back Post** with Silver Imp. Carbon Tip	8094–2234
173293	**19**	**Wall Type Shock Absorber Spring**	12404–28
172590	**20**	**Shelf Type Shock Absorber Spring**	12404–27



Styles "DN-22", "DN-22A" and "DN-22L" Relays

Detail Parts

Styles "DN-22", "DN-22A" D.C. Neutral and "DN-22L" Lightout Relays

Detail Parts

For complete relays refer to Plates E-4935, E-4936 and E-4938. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
184904	2	**Top Plate**, without Cores	C–9433–1
184908	3	**Glass Case**	8163–215
184893	4	**Gasket**	8078–729
131245	5	**Front Terminal Post** (Contact Holder)	8094–2122
134400	6	**Lock Washer**	8486–371
	7	**Terminal Post** with Nuts and Washers (Inc. 1-7a, 1-8, 1-9, 1-10, 2-11 and 2-12)	12451–
115706	7a	**Terminal Post Only**, for Ref. 7	8094–1192
72948	8	**Nut**	8109–383
69705	9	**Washer**	7828–287
29103	10	**Nut**	8109–194
29102	11	**Washer**	7828–139
29101	12	**Nut**	8109–193
	13	**Terminal Post** with Nuts and Washers (Inc. 1-13a, 1-8, 1-9, 1-10, 2-11 and 2-12)	12451–
131234	13a	**Terminal Post Only**, for Ref. 13	8094–2125
	14	**Terminal Post** with Nuts and Washers (Inc. 1-14a, 1-8, 1-9, 3-10 and 2-11)	12451–
199852	14a	**Terminal Post Only**, for Ref. 14	8094–2207
	15	**Terminal Post** with Nuts and Washers (Inc. 1-15a, 1-8, 1-9, 2-10, 4-11 and 2-12)	12451–
113978	15a	**Terminal Post Only**, for Ref. 15	8094–1192
142777	16	**Tag** (Marked +)	8988–75
185123	17	**Armature and Bracket** (Inc. 1-18, 1-19, 2-20 and 2-21)	C–9433–2
	17a	**Armature and Bracket** with Dowels (Inc. 1-17 and 2-23)	C–9433–2

Styles "DN-22", "DN-22A" D.C. Neutral and "DN-22L" Lightout Relays

(Continued)

Detail Parts

For complete relays refer to Plates E-4935, E-4936 and E-4938. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
184891	18	**Armature Assembled with Stop Pins,** for Ref. 17	8157–415
183695	19	**Bracket** for Ref. 17	8303–128
159814	20	**Pivot Screw** for Ref. 17	8378–354
159815	21	**Lock Washer** for Ref. 17	8486–395
	22	**Machine Screw,** No. 8-36x½" Fil. Hd. Br. (N.P.).	
57497	23	**Dowel Pin**	8097–872
150113	24	**Contact Spring Support** (2-Way)	9968–849
170966	24a	**Contact Spring Support** (3-Way)	9968–1014
149339	25	**Lock Washer** (for 2-Way Support and Back Stop Screw Ref. 32)	8486–368
178251	25a	**Lock Washer** (for 3-Way Support)	8486–405
142673	26	**Screw**	8098–1300
158043	27	**Contact Tip** (Silver Imp. Carbon)	8341–476
173737	28	**Nut Lock**	8486–403
134516	29	**Lock Washer** (for 2 and 3-Way Support)	8486–368
171092	29a	**Lock Washer** (for middle spring of 3-Way Support)	8486–405
57996	30	**Screw**	8098–845
	30a	**Screw with Nut, Washer and Lock Washer** (Inc. 1-28, 1-29, 1-30, 1-31 and 1-69)	12471–
151836	31	**Nut**	8109–445
184898	32	**Back Stop Screw Only,** for Ref. 32a	8098–549
	32a	**Back Stop Screw** with Nut and Lock Washer (Inc. 1-32, 1-33 and 1-25)	12471–
1506	33	**Nut** for Ref. 32a	8109–12
150268	34	**Contact Spring Complete** (without connector)	8385–1996

Styles "DN-22", "DN-22A" D.C. Neutral and "DN-22L" Lightout Relays

(Continued)

Detail Parts

For complete relays refer to Plates E-4935, E-4936 and E-4938. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
140833	**34a**	**Contact Spring Complete** (without connector) (For Primary Relay)	8385–1996
184902	**35**	**Washer** (Between contact springs)	7828–379
	36	**Back Contact Spring** (With flexible connector. Not Soldered)	8385–2376
184901	**36a**	**Back Contact Spring** (Without connector)	8385–2376
150140	**37**	**Clamp Washer** for contact springs	8486–367
150166	**38**	**Screw**	8098–550
	38a	**Screw with Lock Washer and Nut** (Inc. 1-29, 1-31 and 1-38)	12471–
185134	**39**	**L.H. Back Post Complete** (Low Voltage)	8094–2334
189079	**39a**	**L.H. Back Post Complete** (With Silver Imp. Carbon Tip for use with Silver Contact Spring) (As shown in dot and dash lines)	8094–981
186906	**40**	**L.H. Back Post Complete** (High Voltage)	8094–2338
185135	**41**	**R.H. Back Post Complete** (Low Voltage)	8094–2334
189080	**41a**	**R.H. Back Post Complete** (With Silver Imp. Carbon Tip for use with Silver Contact Spring) (As shown in dot and dash lines)	8094–981
186905	**42**	**R.H. Back Post Complete** (High Voltage)	8094–2338
62977	**43**	**Screw**	8098–845
184900	**44**	**Connector** with Flexible Connector Ref. 44b	8244–151
184899	**44a**	**Connector** (without Flexible Connector)	8244–151
169336	**44b**	**Flexible Connector Only**	10934–87
184892	**45**	**Name Plate** (For Relays having 2F and 2B dependent contacts)	8225–455
193864	**45a**	**Name Plate** (For Relays having 2F and 1B independent contacts)	8225–455

Styles "DN-22", "DN-22A" D.C. Neutral and "DN-22L" Lightout Relays

(Continued)

Detail Parts

For complete relays refer to Plates E-4935, E-4936 and E-4938. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	46	**Screw,** No. 4x$\frac{5}{16}$" Rd. Hd. Type "Z" Hardened (Tin Pl.).	
168826	48	**Coil Spacing Washer**	8078–1499
	49	**Cap Screw,** $\frac{5}{16}$"-18x$\frac{3}{4}$" Hex. Hd. S. (Cad. Plated)	
184909	50	**Coil Lock**	8735–784
	51	**Terminal Post** with Nuts and Washers (Inc. 1-51a, 1-8, 1-9, 2-10, 4-11 and 2-12)	12451–
118271	51a	**Terminal Post Only,** for Ref. 51	8094–1192
142777	52	**Tag** (Marked "S-1")	8988–75
142777	52a	**Tag** (Marked "S-2")	8988–75
184906	54	**Front Magnet Core**	8101–365
184907	55	**Rear Magnet Core**	8101–365
185129	56	**Shelf Type Shock Absorber Complete** for Styles "DN-22," "DN-22A," "DN-22L" and "DN-22P" Relays. (For details see Plate E-5030)	12404–27
185131	57	**Wall Type Shock Absorber Complete** for Styles "DN-22," "DN-22A" and "DN-22L" Relays without Rectifiers. (For details see Plate E-5030)	12404–28
196403	57a	**Wall Type Shock Absorber Complete** for Styles "DN-22A," "DN-22L" and "DN-22P" Relays with Rectifiers. (For details see Plate E-5030)	12404–28
184894	58	**Back Strap** (Approx. $\frac{5}{32}$"x$\frac{3}{4}$"x3") for Style "DN-22" Relays	8162–253
184895	59	**Back Strap** ($\frac{19}{64}$"x1$\frac{1}{4}$"x3$\frac{1}{2}$") for Styles "DN-22A" and "DN-22L" Relays	8162–253
145747	60	**Washer**	7828–218
188132	61	**Bushing**	8161–144
168308	62	**Contact Tip** (Silver Imp. Carbon)	8341–485

Styles "DN-22", "DN-22A" D.C. Neutral and "DN-22L" Lightout Relays

(Continued)

Detail Parts

For complete relays refer to Plates E-4935, E-4936 and E-4938. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
180978	**63**	**Contact Spring** with Silver Imp. Carbon Tip (with Flexible Connector) (High Voltage Front and Back)	8385–2098
180977	**63a**	**Contact Spring** with Silver Imp. Carbon Tip (without Connector) (High Voltage Front and Back)	8385–2098
180980	**63b**	**Front Spring Only** (High Voltage) with Silver Imp. Carbon Tip (with Flexible Connector)	8385–2099
180979	**63c**	**Front Spring Only** (High Voltage) with Silver Imp. Carbon Tip (without Connector)	8385–2099
180975	**64**	**Stop Spring**	8735–769
131210	**65**	**Nut** for Magnet Cores	8109–426
187058	**66**	**R.H. Back Post Complete** (Low Voltage) (For relay with 1 back contact)	8094–2340
187071	**67**	**R.H. Back Post Complete** (High Voltage) (For relay with 1 back contact)	8094–2341
194343	**68**	**Connector** with Flexible Connector Ref. 44b	8244–155
194342	**68a**	**Connector** (Without Flexible Connector)	8244–155
20686	**69**	**Washer** for Ref. 30a	7828–108
	70	**Clamp Plate** with Studs (Inc. 1-70a, 2-70b, 2-70c, 2-70d and 2-70e)	9999–
195622	**70a**	**Clamp Plate**	9999–1175
195626	**70b**	**Clamp Stud**	8114–889
56349	**70c**	**Washer** used under Top Plate	7826–180
190681	**70d**	**Nut** for Ref. 70	8109–383
44618	**70e**	**Washer** used under Nut Ref. 70d	7828–184
181617	**71**	**Washer** for Ref. 22	7828–368
196409	**72**	**Mounting Strap**	12538–154
141603	**73**	**Nut**	8265–253

Styles "DN-22", "DN-22A" D.C. Neutral and "DN-22L" Lightout Relays

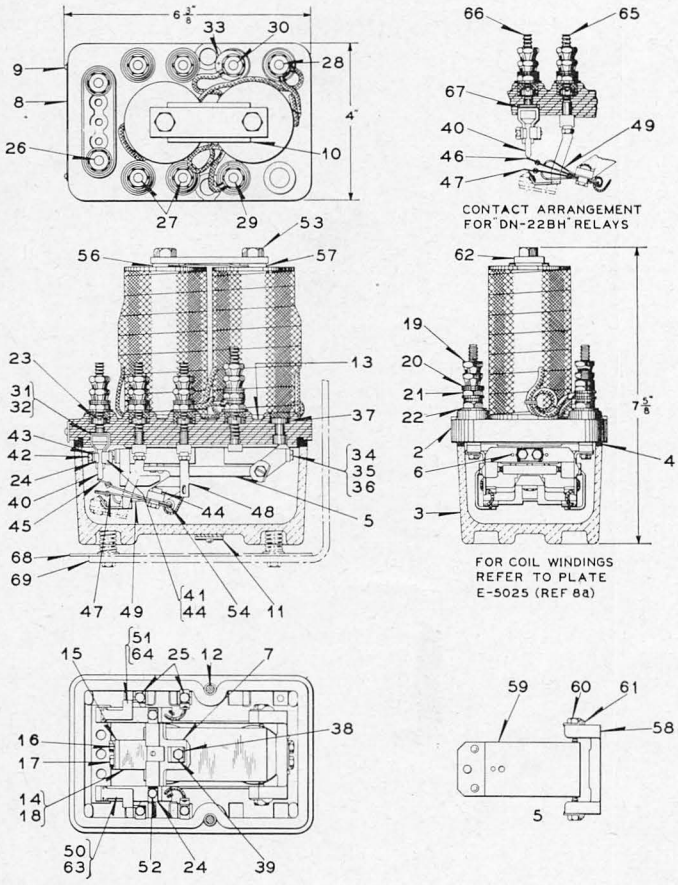
(Continued)

Detail Parts

For complete relays refer to Plates E-4935, E-4936 and E-4938. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	74	**Rectifier** with Cover for "DN-22A" or "DN-22L" Relay. (Order piece number shown on Rectifier nameplate, or state piece number of relay with which Rectifier is to be used).	
	75	**Screw** with Nut Ref. 76 (Used in place of Ref. 14 for Style "DN-22L" Relays).....	12471–
141245	**75a**	**Screw Only** for Ref. 75.....	8098–589
410442	**76**	**Nut.**	



Styles "DN-22B" D. C. Biased Neutral Relay And "DN-22BH" D. C. Biased Neutral High Release Relay

Styles "DN-22B" D. C. Biased Neutral Relay And 'DN-22BH" D. C. Biased Neutral High Release Relay

Detail Parts

Refer to the following Plates for items not listed on this Plate:
Coils: Ref. 8a, Plate E-5025
Plug Couplers: Ref. Aa, Plate E-5035-2
Complete Relays will be found on Plate E-4937.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
273191	**2**	**Top Plate**, without Cores	C–9433–1
184908	**3**	**Case**	8163–215
261990	**4**	**Gasket**	8078–1775
268073	**5**	**Armature and Bracket Assembly Complete** for Style "DN-22B" Relay (Inc. 1-58, 1-59, 2-60 and 2-61)	C–9433–3
268059	**5a**	**Armature and Bracket Assembly Complete** for Style "DN-22BH" Relay (Inc. 1-58a, 1-59a, 2-60 and 2-61)	C–9433–3
	5b	**Armature and Bracket Assembly Complete** with Dowel Pins for Style "DN-22B" Relay (Inc. 1-5 and 2-6)	C–9433–3
	5c	**Armature and Bracket Assembly Complete** with Dowel Pins for Style "DN-22BH" Relay (Inc. 1-5a and 2-6)	C–9433–3
57497	**6**	**Dowel Pin**	8097–872
170966	**7**	**Contact Spring Support**	9968–1014
184892	**8**	**Name Plate** for Relays with 2F-2B Contacts	8225–455
193864	**8a**	**Name Plate** for Relays with 2F-1B Contacts	8225–478
	9	**Screw**, No. 4-40x¼" Type "F" Rd. Hd. (C. N. 52620) (Tin Pl.)	
184909	**10**	**Coil Lock**	8735–784
195622	**11**	**Clamp Plate**	9999–1175
266724	**12**	**Clamp Stud** with Nut and Washers (Inc. 1-12a, 1-12b, 1-12c and 1-12d)	8114–889
195626	**12a**	**Clamp Stud only**	8114–889
56349	**12b**	**Washer** used under Top Plate	7826–180
190681	**12c**	**Nut**	8109–383

Styles "DN-22B" D. C. Biased Neutral Relay And "DN-22BH" D. C. Biased Neutral High Release Relay

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
44618	12d	**Washer** used under Nut Ref. 12c	7828–184
168826	13	**Coil Spacing Washer**	8078–1499
269811	14	**Permanent Magnet**	12586–29
269847	15	**Plate**	9999–2418
268066	16	**Lock Washer**	8486–432
268067	17	**Screw**	8098–305
269846	18	**Pole Shoe**	12748–76
29101	19	**Nut**	8109–193
29102	20	**Washer**	7828–139
29103	21	**Nut**	8109–194
69705	22	**Washer**	7828–287
72948	23	**Nut**	8109–383
134516	24	**Lock Washer**	8486–368
171092	24a	**Lock Washer** (for middle spring of contact support)	8486–405
62977	25	**Screw**	8098–845
	26	**Binding Post** with Nuts and Washers (Inc. 1-26a, 2-19, 2-20, 1-21, 1-22 and 1-23)	12451–
115706	26a	**Binding Post Only**	8094–1192
	27	**Binding Post** with Nuts and Washers (Inc. 1-27a, 2-19, 2-20, 1-21, 1-22, 1-23, 1-24 and 1-25)	12451–
131234	27a	**Binding Post Only**	8094–2125
	28	**Binding Post** with Nuts and Washers (Inc. 1-28a, 2-20, 3-21, 1-22 and 1-23)	12451–
199852	28a	**Binding Post Only**	8094–2207
	29	**Binding Post** with Nuts and Washers (Inc. 1-29a, 2-19, 3-20, 2-21, 1-22 and 1-23)	12451–

Styles "DN-22B" D. C. Biased Neutral Relay And "DN-22BH" D. C. Biased Neutral High Release Relay

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
118271	**29a**	**Binding Post Only**	8094–1192
	30	**Binding Post** with Nuts and Washers (Inc. 1-30a, 2-19, 4-20, 2-21, 1-22 and 1-23)	12451–
113978	**30a**	**Binding Post Only**	8094–1192
131245	**31**	**Front Binding Post** (Contact Holder)	8094–2122
134400	**32**	**Nut Lock**	8486–371
142777	**33**	**Tag** (Marked +)	8988–75
195913	**34**	**Screw**	8098–1300
260688	**35**	**Washer**	7828–265
259269	**36**	**Lock Washer**	8486–432
239949	**37**	**Dummy Plug**	8078–732
178251	**38**	**Nut Lock**	8486–405
142673	**39**	**Screw**	8098–1300
158043	**40**	**Contact Tip** (Silver Imp. Carbon)	8341–476
173737	**41**	**Nut Lock**	8486–403
	42	**Screw** with Nut, Washer and Lock Washer (Inc. 1-42a, 1-24, 1-41, 1-43 and 1-44)	12471–
57996	**42a**	**Screw Only**	8098–845
20686	**43**	**Washer**	7828–108
151836	**44**	**Nut**	8109–445
189835	**45**	**Front Contact Spring Complete** (Without Flexible Connector) for Style "DN-22B" Relay	8385–2336
279295	**46**	**Front Contact Spring Complete** (Without Flexible Connector) for Style "DN-22BH" Relay	8385–2336
234980	**47**	**Back Contact Spring Complete** (Without Flexible Connector) for Styles "DN-22B" and "DN-22BH" Relays	8385–2376

Styles "DN-22B" D. C. Biased Neutral Relay And "DN-22BH" D. C. Biased Neutral High Release Relay

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
184900	48	**Connector** with Flexible Connector	8244–151
194343	48a	**Connector** with Flexible Connector (for relay having independent back contact)	8244–155
156580	49	**Stop Spring**	8385–2191
187079	50	**L.H. Back Post Complete** with Silver Tip	8094–2342
187078	51	**R.H. Back Post Complete** with Silver Tip	8094–2342
187058	51a	**R.H. Back Post Complete** with Silver Tip. (For relay with 1 back contact)	8094–2340
	52	**Screw** with Washer and Nut (Inc. 1-52a, 1-24 and 1-44)	12471–
150166	52a	**Screw**	8098–550
	53	Cap Screw, $\frac{5}{16}$"-18x$\frac{3}{4}$" Hex. Hd. S. (C.N. 50036) (Cad. Pl.)	
184902	54	**Washer** (used between Contact Springs)	7828–379
104169	55	**Nut** for Cores (Not Shown)	8265–359
268056	56	**Front Core**	8101–419
184907	57	**Rear Core**	8101–365
183695	58	**Armature Bracket** for "DN-22B" Relay	8303–128
268070	58a	**Armature Bracket** for "DN-22BH" Relay	8303–140
268072	59	**Armature Complete** for "DN-22B" Relay	8157–508
268058	59a	**Armature Complete** for "DN-22BH" Relay	8157–507
159814	60	**Pivot Screw**	8378–354
159815	61	**Lock Washer**	8486–395
184894	62	**Back Strap** for Style "DN-22B" Relay	8162–253
184895	62a	**Back Strap** for Style "DN-22BH" Relay	8162–253
277827	63	**L.H. Back Post Complete** with Silver Impregnated Carbon Tip	8094–2500

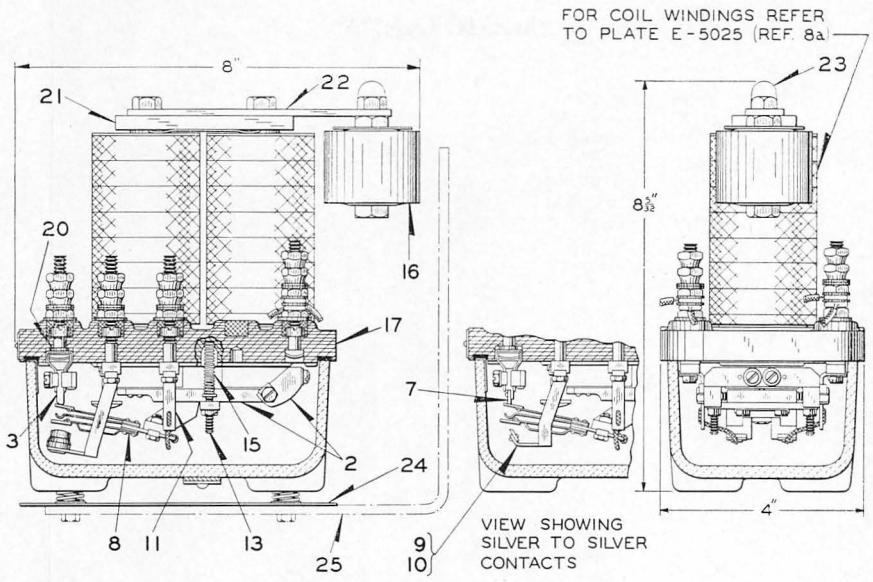
Styles "DN-22B" D. C. Biased Neutral Relay And "DN-22BH" D. C. Biased Neutral High Release Relay

Detail Parts

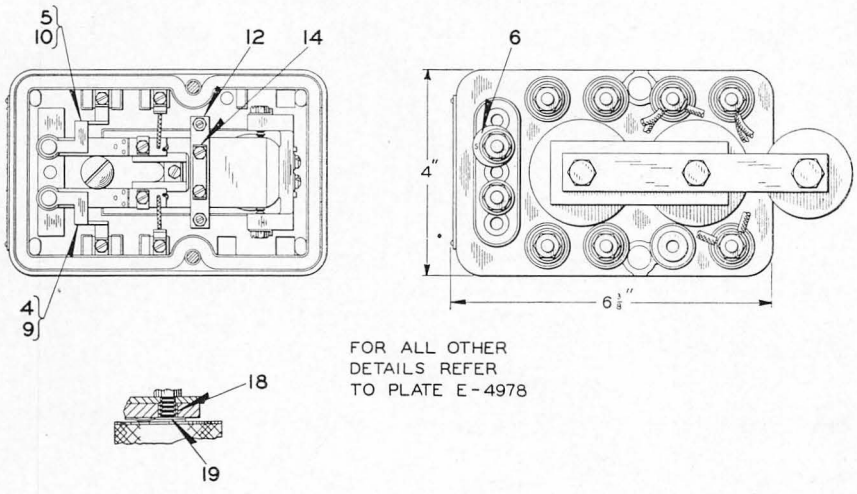
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
277826	**64**	**R.H. Back Post Complete** with Silver Impregnated Carbon Tip	8094–2500
	65	**Binding Post** with Nuts and Washers (Inc. 1-65a, 2-19, 2-20, 1-21, 1-22, 1-23, 1-24 and 1-25)	12451–
277760	**65a**	**Binding Post Only**	8094–2445
	66	**Binding Post** with Nuts and Washers (Inc. 1-26a, 2-19, 2-20, 1-21, 1-22, 1-23 and 1-67)	12451–
52335	**67**	**Washer**	7828–184
185129	**68**	**Shelf Type Shock Absorber Base** (For details see Plate E-5030)	12404–50
185131	**69**	**Wall Type Shock Absorber Base** (For details see Plate E-5030)	12404–28



IN ABOVE VIEWS FRONT CONTACTS ARE SHOWN CLOSED AS WHEN RELAY IS ENERGIZED.



FOR ALL OTHER DETAILS REFER TO PLATE E-4978

Style "DN-22P" Power Transfer Relay

Detail Parts

Style "DN-22P" Power Transfer Relay

Detail Parts

For complete Relays refer to Plate E-4941. For details not shown on this Plate refer to Plate E-4978. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
196448	2	**Armature and Bracket** (Inc. 1-2a, of this Plate and 1-19, 2-20 and 2-21 of Plate E-4978)	C–9433–2
196447	2a	**Armature Only,** for Ref. 2	8157–431
	2b	**Armature and Bracket** (Inc. 1-2 of this Plate and 2-23 of Plate E-4978)	C–9433–
196406	3	**Contact Tip** (Silver Imp. Carbon)	8341–242
196404	4	**Back Post, L.H.** with Silver Imp. Carbon Tip	8094–981
196405	5	**Back Post, R.H.** with Silver Imp. Carbon Tip	8094–981
142777	6	**Tag** (Marked "S")	8988–75
196399	7	**Contact Post** with Silver Tip	8094–1111
	8	**Front and Back Contact Spring Assembly** with Silver Tips and Flexible Connector	8385–
196397	8a	**Front and Back Contact Spring Assembly** with Silver Tips (Without Flexible Connector)	8385–2463
196400	9	**Back Post, L.H.** with Silver Tip	8094–1112
196401	10	**Back Post, R.H.** with Silver Tip	8094–1112
196531	11	**Connector** with Flexible Connector	8244–151
196530	11a	**Connector** without Flexible Connector	8244–151
196407	12	**Plate**	12538–155
	13	**Adjusting Screw** with Nut Ref. 13b	12471–
196408	13a	**Adjusting Screw Only,** for Ref. 13	8098–1411
1506	13b	**Hex. Nut** for Ref. 13	8109–12
180815	14	**Lock Washer**	8486–399
135953	15	**Spring**	8124–144
197157	16	**Style "RE-7" Rectifier,** for 8 Volt Power Transfer Relay	12558–33

Style "DN-22P" Power Transfer Relay

(Continued)

Detail Parts

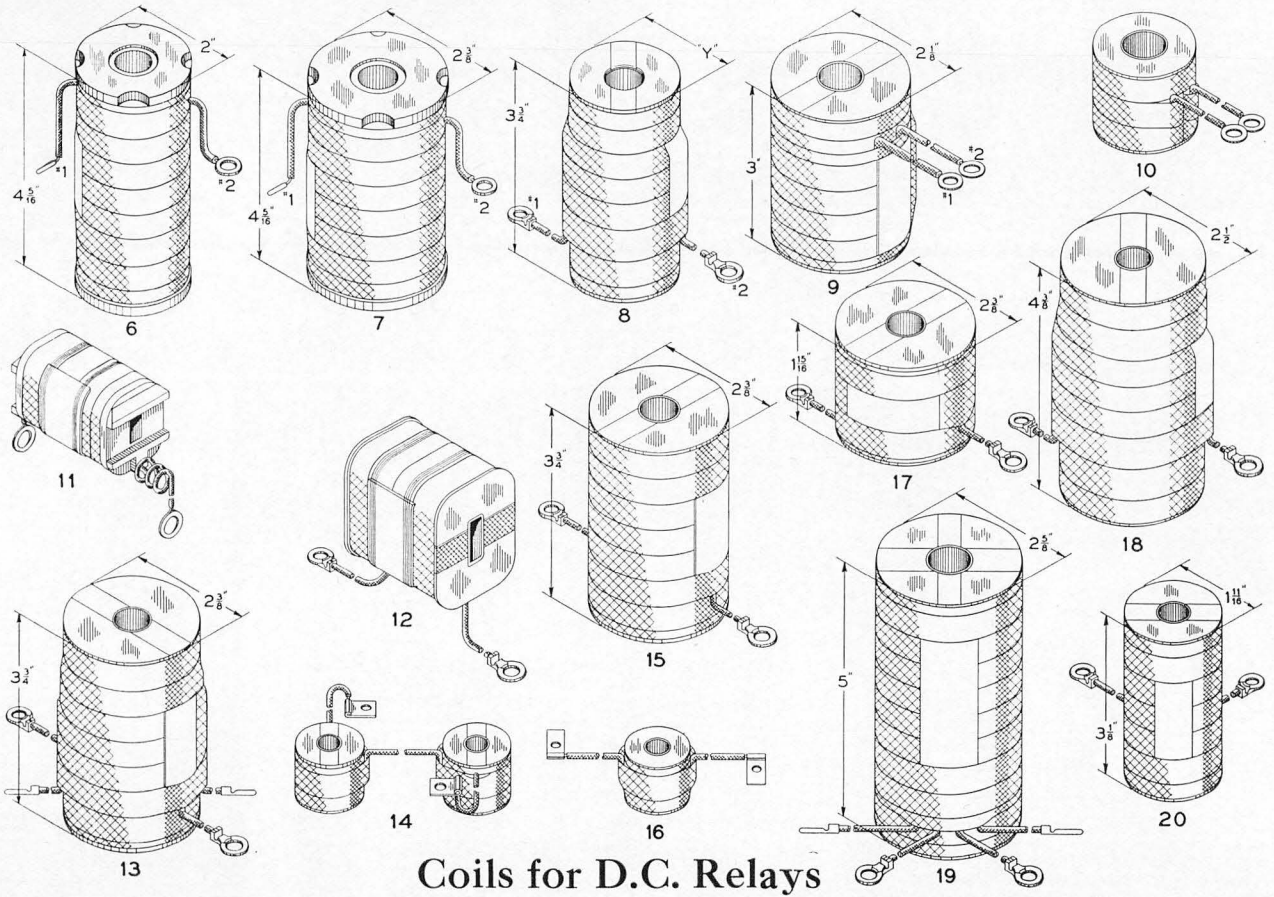
For complete Relays refer to Plate E-4941. For details not shown on this Plate refer to Plate E-4978. For Coil Windings refer to Ref. 8a, Plate E-5025.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
196450	**16a**	**Style "RE-7" Rectifier,** for 10 Volt Power Transfer Relay	12558–30
196315	**16b**	**Style "RE-7" Rectifier,** for 12 Volt Power Transfer Relay	12558–32
197666	**17**	**Top Plate,** without Cores	C–9433–1
25107	**18**	**Bushing**	C–7459–2
196812	**19**	**Shim**	7828–176
52335	**20**	**Washer**	7828–184
184895	**21**	**Back Strap** ($\frac{19}{64}$"x1¼"x3½") for Style "DN-22P" Relays	8162-253
196409	**22**	**Mounting Strap**	12538–154
141603	**23**	**Nut**	8265–253
185129	**24**	**Shelf Type Shock Absorber** for Style "DN-22P" Relays. (For details see Plate E-5030)	12404–27
196403	**25**	**Wall Type Shock Absorber** for Style "DN-22P" Relays. (For details see Plate E-5030)	12404–28

PLATE **E-5025**

UNION SWITCH & SIGNAL CO.



Coils for D.C. Relays

Coils for D.C. Relays

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Magnet Coil for Model 12 Polarized and Interlocking, and Model 13 Round Base Neutral Relays.

	Ref.	Description	
	6	**Magnet Coil for Style . . Relay, . . Ohms Resistance Per Coil, Piece Number** . . (Select resistance and piece number from table below).	
Piece		Resistance Per Coil	Drawing Reference
80878		0.18	8133–127
114876		0.2	8133–127
90842		0.5	8133–127
74524		1	8133–127
114875		1 Slow Release	8133–140
72980		1.5	8133–127
68728		1.75	8133–127
69153		2	8133–127
144600		2 No. 2 lead long for parallel connection of coils.	8133–127
97627		2 Slow Release	8133–140
118923		2 Slow Release No. 2 lead long for parallel connection of coils	8133–140
78527		2.5	8133–127
97479		3	8133–127
127580		3.5	8133–127
90755		4	8133–127
69155		4.5	8133–127
96232		5.5	8133–127

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 6)	Drawing Reference
79745		6	8133–127
70577		8	8133–127
129565		10	8133–127
81146		15	8133–127
91008		17.5	8133–127
128165		17.5 Slow Release	8133–140
86563		20	8133–127
87583		25	8133–127
99348		25 Slow Release	8133–140
94564		28.25	8133–127
124240		37.5 Slow Release	8133–140
81144		50	8133–127
117776		50 Slow Release	8133–140
73349		62.5	8133–127
152443		62.5 Slow Release	8133–140
111458		68	8133–127
116282		70	8133–127
94118		75	8133–127
136537		75 Slow Release	8133–140
75643		100	8133–127
114316		100 Slow Release	8133–140
69244		125	8133–127
85839		125 Slow Release	8133–140
115176		150	8133–127

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 6)	Drawing Reference
85531		200	8133–127
143945		200 Slow Release	8133–140
95874		215	8133–127
96071		225	8133–127
69152		250	8133–127
80918		250 Slow Release	8133–140
89670		300	8133–127
78925		335	8133–127
133380		335 Slow Release	8133–140
72252		375	8133–127
117987		375 Slow Release	8133–140
76085		400	8133–127
69154		500	8133–127
76208		500 Slow Release	8133–140
96039		1000	8133–127

Magnet Coil for 4, 6, 8 and 10-Point Model 13 Square Base Relays.

	Ref.	Description
	7	**Magnet Coil for Style .. Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select resistance and piece number from following table):

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 7)	Drawing Reference
79337		1	8133–132
69899		2	8133–132
177166		2 With long leads for parallel connection of coils.	8133–132
136743		2 Slow Release	8133–327
76942		2.5	8133–132
99524		3	8133–132
81583		4.5	8133–132
120689		5	8133–132
115987		6	8133–132
115311		8	8133–132
124465		12.5 Slow Release	8133–327
117835		17.5	8133–132
123904		20	8133–132
77979		25	8133–132
159215		25 Slow Release	8133–327
119610		40	8133–132
114457		50	8133–132
142564		68	8133–132
89658		75	8133–132
123365		100	8133–132
95006		125	8133–132
135854		125 Slow Release	8133–327
142565		150	8133–132

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 7)	Drawing Reference
132720		200 Slow Release	8133–327
90309		250	8133–132
114830		250 Slow Release	8133–327
113795		300	8133–132
118209		335	8133–132
170592		375	8133–132
120447		375 Slow Release	8133–327
158569		400	8133–132
68732		500	8133–132
123944		500 Slow Release	8133–327
96944		1000	8133–132

Magnet Coil for Styles "DN-11," "DN-12," "DX-13," "DP-14" and "DP-23" Relays.

	Ref.	Description
	8	**Magnet Coil for Style . . Relay, . . Ohms Resistance Per Coil, Piece Number . . .** (Select resistance and piece number from table below):

Piece		Resistance Per Coil	"Y" Approx.	Drawing Reference
***184912**		1	$2\frac{1}{8}$"	8133–452
144439		2	$2\frac{3}{8}$"	8133–365
***169458**		4QA (For Quick Shunting)	$1\frac{15}{16}$"	8133–339

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 8)	"Y" Approx.	Drawing Reference
156500		4.5	2 3/8"	8133–365
156501		8	2 3/8"	8133–365
***171986**		10 Slow Release	2"	8133–388
***163069**		12	1 15/16"	8133–339
***167467**		20	1 15/16"	8133–339
***179520**		20 Slow Release	2"	8133–388
***189122**		27.5	2 1/8"	8133–452
***159678**		30	1 15/16"	8133–339
***177100**		35 Slow Release	2"	8133–388
***145829**		45	1 15/16"	8133–339
***186691**		45 Slow Release	2"	8133–388
***157893**		50 Slow Release	2"	8133–388
***153693**		50	2 1/8"	8133–452
***137703**		75	1 15/16"	8133–339
***138111**		125	1 15/16"	8133–339
***157894**		125 Slow Release	2"	8133–388
***151742**		180	1 15/16"	8133–339
***157895**		200 Slow Release	2"	8133–388
***157896**		250 Slow Release	2"	8133–388
***153698**		250	2 1/8"	8133–452
***144561**		335	1 15/16"	8133–339
***143067**		500	1 15/16"	8133–339
***157897**		500 Slow Release	2"	8133–388

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 8)	"Y" Approx.	Drawing Reference
***156502**		750	$1\frac{15}{16}$"	8133–339
***172632**		750 Slow Release	2"	8133–388
***147953**		1000	$1\frac{15}{16}$"	8133–339

*These Coils are identical with those shown under Ref. 8a for Styles "DN-22," "DN-22A," "DN-22L" and "DN-22P" Relays.

Magnet Coil for Styles "DN-22," "DN-22A," "DN-22L" and "DN-22P" Relays.

	Ref.	Description
	8a	**Magnet Coil for Style . . Relay, . . Ohms Resistance Per Coil, Piece Number . . .** (Select resistance and piece number from table below):

Piece		Resistance Per Coil	"Y" Approx.	Drawing Reference
206446		0.16	$2\frac{1}{8}$"	8133–452
190940		0.25	$1\frac{15}{16}$"	8133–339
196624		0.37	$2\frac{1}{8}$"	8133–452
***184912**		1	$2\frac{1}{8}$"	8133–452
188877		1 Two windings, three leads, for Style "DN-22" Primary Relays	$2\frac{1}{8}$"	8133–440
169440		1.5 Slow Release	2"	8133–388
184897		2	$2\frac{1}{8}$"	8133–452
187666		2 Two windings, three leads, for Style "DN-22" Primary Relays	$2\frac{1}{8}$"	8133–440

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 8a)	"Y" Approx.	Drawing Reference
*169458		4QA (For Quick Shunting)	1 15/16"	8133–339
150152		5	1 15/16"	8133–339
192308		5 Slow Release	2"	8133–388
138110		8	1 15/16"	8133–339
*171986		10 Slow Release	2"	8133–388
*163069		12	1 15/16"	8133–339
*167467		20	1 15/16"	8133–339
*179520		20 Slow Release	2"	8133–388
*189122		27.5	2 1/8"	8133–452
*159678		30	1 15/16"	8133–339
*177100		35 Slow Release	2"	8133–388
*145829		45	1 15/16"	8133–339
*186691		45 Slow Release	2"	8133–388
*157893		50 Slow Release	2"	8133–388
*153693		50	2 1/8"	8133–452
*137703		75	1 15/16"	8133–339
*138111		125	1 15/16"	8133–339
*157894		125 Slow Release	2"	8133–388
*151742		180	1 15/16"	8133–339
*157895		200 Slow Release	2"	8133–388
*157896		250 Slow Release	2"	8133–388
*153698		250	2 1/8"	8133–452
*144561		335	1 15/16"	8133–339

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 8a)	"Y" Approx.	Drawing Reference
***143067**		500	$1\frac{15}{16}''$	8133–339
***157897**		500 Slow Release	2″	8133–388
***156502**		750	$1\frac{15}{16}''$	8133–339
***172632**		750 Slow Release	2″	8133–388
***147953**		1000	$1\frac{15}{16}''$	8133–339

*These Coils are identical with those shown under Ref. 8 for Styles "DN-11," "DN-12," "DX-13," "DP-14" and "DP-23" Relays.

Magnet Coil for Styles "NF" and "NF-2" Relays.

	Ref.	Description
	9	**Magnet Coil for Style . . Relay, . . Ohms Resistance Per Coil, Piece Number . . .** (Select Resistance and Piece Number from table below):

Piece		Resistance Per Coil	Drawing Reference
190563		4	8133–336
183668		175	8133–336
135256		175	8133–336
125629		200	8133–336
125630		350	8133–336
157409		400	8133–336
135257		400	8133–336

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Large Magnet Coil for Style "DD-24" Relay.

	Ref.	Description	
	9a	**Large Magnet Coil for Style "DD-24" Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select Resistance and Piece Number from table below):	
Piece		Resistance Per Coil	Drawing Reference
191874		1600	8133–336

Small Magnet Coil for Style "DD-24" Relay.

	Ref.	Description	
	10	**Small Magnet Coil for Style "DD-24" Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select Resistance and Piece Number from table below):	
Piece		Resistance Per Coil	Drawing Reference
191957		475	8133–456

Magnet Coil for Style "DNL-3" Relay.

	Ref.	Description
	11	**Magnet Coil for Style "DNL-3" Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select Resistance and Piece Number from following table):

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 11)	Drawing Reference
136973		0.05	8133–346
135321		0.14	8133–346
187769		1	8133–347
145091		2	8133–347
141999		5	8133–347
140303		8	8133–347
138650		30	8133–347
135842		44	8133–347
181850		60	8133–347
135322		78	8133–347
138134		125	8133–347
178163		250	8133–347
158282		295	8133–347

Magnet Coil for Style "DNL-4" Relay.

	Ref.	Description	
	12	**Magnet Coil for Style "DNL-4" Relay, .. Ohms Resistance Per Coil, Piece Number** ... (Select Resistance and Piece Number from table below).	
Piece		Resistance Per Coil	Drawing Reference
182834		0.05	8133–423
179446		0.14	8133–423

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece		Resistance Per Coil (Continuation of Ref. 12)	Drawing Reference
182835		2	8133–423
182836		5	8133–423
182837		8	8133–423
182838		19	8133–423
182839		30	8133–423
182840		44	8133–423
182841		60	8133–423
179447		78	8133–423
182842		125	8133–423
182843		250	8133–423
182844		295	8133–423

Main Magnet Coil for Style "DT-10" Time Element Relay.

	Ref.	Description
	13	**Main Magnet Coil for Style "DT-10" Time Element Relay, .. Ohms Resistance Per Coil, Piece Number** ... (Select Resistance and Piece Number from following table):

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

(Continuation of Ref. 13)

Piece		Resistance Per Coil for Low Resistance Winding	Resistance Per Coil for High Resistance Winding	Remarks	Drawing Reference
161822		32.5	67.5	For 6.0 Volt Relay	8133–394
160946		50	125	For 8.0 Volt Relay	8133–394
160948		80	195	For 10.0 Volt Relay	8133–394
160949		125	275	For 12.0 Volt Relay	8133–394
176640		175	450	For 14.0 Volt Relay	8133–394

Pair of Neutralizing Coils for Style "DT-10" Time Element Relay.

	Ref.	Description
	14	**Pair of Neutralizing Coils for Style "DT-10" Time Element Relay, .. Ohms Resistance Per Pair, Piece Number ...** (Select Resistance and Piece Number from table below):

Piece		Ohms Per Pair	Remarks	Drawing Reference
161275		11	For 6.0 Volt Relay	8133–395
168894		18	For 8.0 Volt Relay	8133–395
168895		28	For 10.0 Volt Relay	8133–395
168896		48	For 12.0 Volt Relay	8133–395
176641		68	For 14.0 Volt Relay	8133–395

Main Magnet Coil for Style "DP-17" Relay.

	Ref.	Description
	15	**Main Magnet Coil for Style "DP-17" Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select Resistance and Piece Number from following table):

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

(Continuation of Ref. 15)

Piece		Resistance Per Coil	Remarks	Drawing Reference
188858		87.5	For 8.0 Volt Energization	8133–365
191121		125	For 10.0 Volt Energization	8133–365
171491		200	For 12.0 Volt Energization	8133–365

Neutralizing Coil for Style "DP-17" Relay.

	Ref.	Description
	16	**Neutralizing Coil for Style "DP-17" Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select Resistance and Piece Number from table below):

Piece		Total Ohms	Remarks	Drawing Reference
188857		75	For 8.0 Volt Energization	8133–409
191147		125	For 10.0 Volt Energization	8133–409
173516		150	For 12.0 Volt Energization	8133–409

Magnet Coil for Styles "DN-18" and "DN-19" Slow Pick-Up, Slow Release Relays.

	Ref.	Description
	17	**Magnet Coil for Style .. Slow Pick-Up, Slow Release Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select Resistance and Piece Number from following table):

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

(Continuation of Ref. 17)

Piece		Resistance Per Coil	Remarks	Drawing Reference
174007		225	(One Coil Per Relay)	8133–410
173786		350	(One Coil Per Relay)	8133–410
174156		500	(One Coil Per Relay)	8133–410

Magnet Coil for Style "DN-18" Slow Pick-Up, Ordinary Release Relay.

	Ref.	Description
	18	**Magnet Coil for Style "DN-18" Slow Pick-Up, Ordinary Release Relay, .. Ohms Resistance Per Coil, Piece Number** ... (Select Resistance and Piece Number from table below):

Piece		Resistance Per Coil	Remarks	Drawing Reference
187708		3.75		8133–441
187681		18		8133–441
187670		45		8133–441
193025		1100		8133–441
190576		1500		8133–441

Main Magnet Coil for Styles "DP-20" and "DP-21" Relays.

	Ref.	Description
	19	**Main Magnet Coil for Style .. Relay, .. Ohms Resistance Per Coil, Piece Number** ... (Select Resistance and Piece Number from following table):

Coils for D.C. Relays

(Continued)

All Coils are wound with enameled wire. Coils for external mounting are impregnated. Coils for internal mounting are given a special baking varnish treatment.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

(Continuation of Ref. 19)

Piece		Primary Winding Resistance Per Coil	Secondary Winding Resistance Per Coil	Remarks	Drawing Reference
187549		1	36		8133–426
181676		2	36		8133–426
181485		75	140		8133–426
181639		125	140		8133–426
181641		200	140		8133–426
181444		335	140		8133–426

Auxiliary Magnet Coil for Styles "DP-20" and "DP-21" Relays.

	Ref.	Description
	20	**Auxiliary Magnet Coil for Style .. Relay, .. Ohms Resistance Per Coil, Piece Number ...** (Select Resistance and Piece Number from table below).

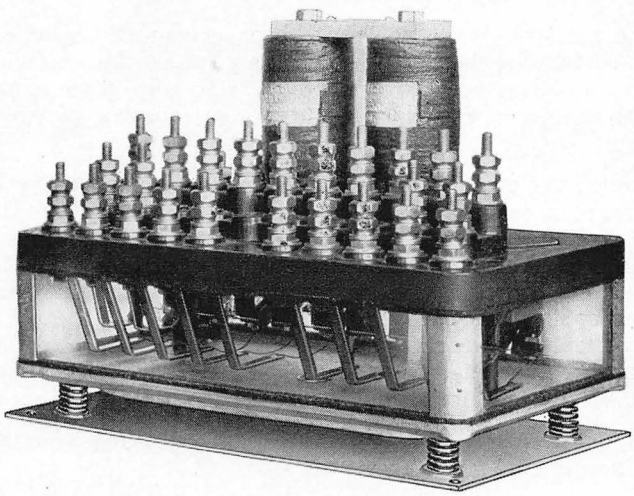
Piece		Resistance Per Coil	Remarks	Drawing Reference
182416		55	Use with 36 Ohms secondary winding on main coil	8133–427
181445		135	Use with 140 Ohms secondary winding on main coil	8133–427

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBERS FOR UNION RELAYS

(Preliminary information to Plate E-5030)

In this catalog will be found improved and substantially constructed designs of shock absorbers which have been developed to minimize adverse affects which may result in those exceptional cases where vibration of a relay housing structure is excessive.



Shock Absorber as applied to Union Style "DN-11" (10-point) Relay

FOR D. C. RELAYS

The bases of Style DN-11 and many other recently designed D.C. Union Relays are equipped with studs which fit into the tops of coil springs, the bottoms of which are securely fastened with crimped eyelets to a No. 18 gauge sheet steel plate. This construction tends to maintain the vertical alignment of the springs since it distributes any distorting force over four springs. Model 13 Relays are equipped with studs if shock absorber springs are included in the order.

(Reprinted February, 1932
Supersedes Issue of 4-29)

Each shock absorber assembly is designed to support a particular relay, and is marked to indicate the relay on which it is to be used. A different platform is required for each relay size and it is important that the proper assembly be specified from Plate E-5030. In many cases, the rear portion of a relay is heavier than the front portion and in order to compensate for this and to maintain the relay in a level position at all times, stronger coil springs are fastened to the rear of the shock absorber plate. The plate is stencilled to indicate the "front."

Since the springs of the shock absorber cannot spread and the bearing surface of the plate is relatively large, the tendency of a relay to walk is reduced to a minimum. To eliminate creeping entirely, holes are provided in the plate for screwing or tacking to the relay shelf.

Through the use of wall brackets, this type of spring buffer may readily be equipped for the wall mounting of relays as shown in Refs. Aa and F, Plate E-5030. The wall brackets are drilled and slotted near the upright ends to fit over the heads of screws. The holes in the horizontal portions are tapped so that the base of the shock absorber, as illustrated in View "X" Plate E-5030, may be fastened securely thereto. The screws for fastening the shock absorber plate to the brackets are inserted through the eyelets which secure the coil springs. The screws are locked in position by means of jam nuts.

Brackets are made of $\frac{3}{16}''$ strap steel and provide a very substantial wall mounting structure.

FOR A. C. RELAYS

Shock absorbers are also available for our alternating current relays. The construction is practically the same as that used for D.C. Relays except that the springs, in addition to being secured to a lower plate, are also fastened to a top plate. The relays are fastened to the top plate of this type of buffer by screws which are threaded into the holes provided in the base of the relay for the strings which secure the mechanism during shipment. These shock absorbers are illustrated in Refs. H, J, K and N, Plate E-5030. ANL-30 relays require a slightly different type of spring support as illustrated in Ref. M, Plate E-5030.

ORDERING INSTRUCTIONS

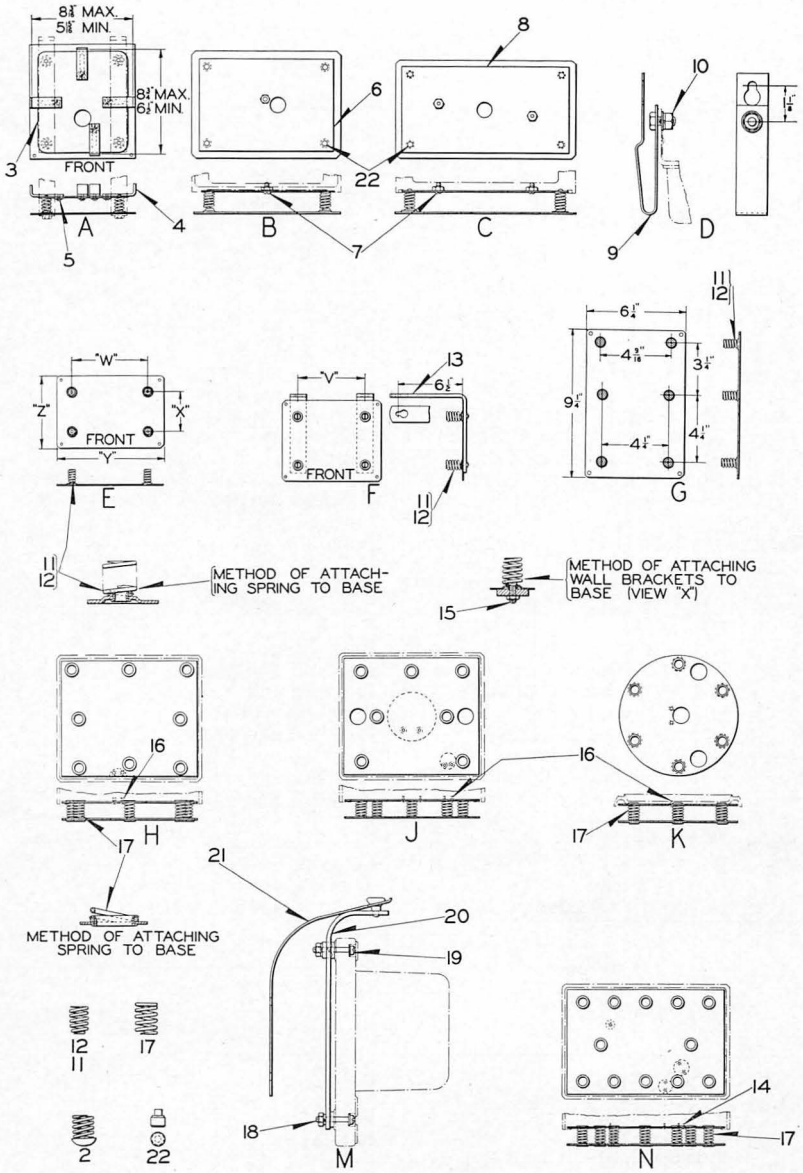
Below find tabulation showing the various "Union" Relays with the proper Shock Absorber Base Reference.

D.C. RELAYS		
Type of Relay	Shock Absorber Base Ref. Plate E-5030	Remarks
Model 9-C-2 Round Base Relay	Refs. A and Aa	
Model 12 Polar Relay (2N & 2R)	Refs. A, Aa, En and Fh	
Model 12 Polar Relay (4N & 4R)	Refs. A, Aa, Ep and Fj	
Hall Polarized Relay	Refs. A and Aa	
Model 12 Interlocking Relay	Refs. C, Es, Fs and Fu	
Model 13 Round Base Relay	Refs. A, Aa, Eh and Fm	
Model 13 Sq. Base Relay (4 Pt.)	Refs. A, Aa, Ek and Fp	
Model 13 Sq. Base Relay (6 Pt.)	Refs. A, Aa, Ej and Fk	
Model 13 Sq. Base Relay (8 Pt.)	Refs. B, Er, Fr and Ft	
Model 13 Sq. Base Relay (10 Pt.)	Refs. B and Ft	
Style "NF" Flasher Relay	Refs. A and Aa	
Hall Style "K" Neutral Relay	Refs. A and Aa	
Hall Style "H" Relay (4 & 6 Pt.)	Refs. A and Aa	
Style "DNL-3" Relay	Ref. D	
Style "DN-10" Relay (4 Pt.)	Refs. Eq and Fq	
Style "DN-11" Relay (4 Pt.)	Refs. E and F	
Style "DN-11" Relay (4 Pt. & Rect.)	Ref. G	
Style "DN-11" Relay (6 Pt.)	Refs. Ea and Fa	
Style "DN-11" Relay (8 Pt.)	Refs. Eb and Fb	
Style "DN-11" Relay (10 Pt.)	Refs. Ec and Fc	
Style "DN-12" Relay (4 Pt.)	Refs. E and F	
Style "DN-12" Relay (6 Pt.)	Refs. Ea and Fa	
Style "DN-12" Relay (8 Pt.)	Refs. Eb and Fb	
Style "DN-12" Relay (10 Pt.)	Refs. Ec and Fc	
Style "DX-13" Interlocking Relay	Refs. Ed and Fd	
Style "DP-14" Polar Relay (2N & 2R)	Refs. Ee and Fe	
Style "DP-14" Polar Relay (4N & 4R)	Refs. Ef and Ff	
Style "DP-14" Polar Relay (6N & 6R)	Refs. Eg and Fg	
Style "DP-17" Relay	Refs. Eg and Fg	
Style "DT-10" Time Element Relay	Refs. Ef and Ff	

A.C. RELAYS		
Type of Relay	Shock Absorber Base Ref. Plate E-5030	Remarks
Style "SV-20" and "SV-21" Relays	Ref. H	
Style "SV-30," "SV-31" and "SV-32," and Model 15 Relays	Ref. J	
Style "SLV-13" Relay	Ref. K	
Style "TV-30" and "TV-40" Relays	Ref. N	
Style "ANL-30" Relay	Ref. M	

PLATE E-5030

UNION SWITCH & SIGNAL CO.



SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS

See Tabulation preceding this plate for assistance in selection of type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
156007	*A	**Shelf Type Adjustable Shock Absorber Base** complete as shown (Inc. 1-Ab, and 1-Em)	12404–24
174233	*Aa	**Wall Type Adjustable Shock Absorber Base** complete as shown in dot and dash lines (Inc. 1-Ab and 1-Fn)	12404–24
174068	**Ab**	**Platform only,** for Refs. A and Aa (Inc. 1-3 and 4-4)	12404–24
		*The shock absorber bases listed above can be applied to the following relays:—	
		Model 13 D.C. Neutral Rd. Base Relay, Model 13 D. C. Neutral 4 Pt. Sq. Base Relay, Model 13 D.C. Neutral 6 Pt. Sq. Base Relay, Model 12 D.C. Polarized Relay (2F & 2B and 4F & 4B Polarized Contacts), Style "NF" D.C. Flasher Relay, Type 9-C-2 D.C. Rd. Base Relay, Hall Style "K" Neutral Relay, Hall Polarized Relay, Hall Style "H" 4 Pt. Relay and Hall Style "H" 6 Pt. Relay.	
136008	**B**	**Shock Absorber Base** complete as shown for applying to Model 13, 8 and 10 Pt. Sq. Base Relays as shown on Plates E-4816 and E-4817 (Without Studs in Base Plate) (Inc. 1-Er and 1-6)	12404–15
135767	**C**	**Shock Absorber Base** complete as shown for applying to Model 12 Interlocking Relay without Studs in Base Plate (Inc. 1-Es and 1-8)	12404–11
151539	**D**	**Shock Absorber Spring** with Bolt, Nut and Washers (Inc. 1-9 and 1-10) for applying to "DNL-3" Wall mounting Relay as shown on Plate E-5070 (two required for each Relay)	12404–21

PLATE E-5030

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS (Continued)

See Tabulation preceding this plate for assistance in selection of type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Shelf Type Shock Absorber Base complete, for application to D.C. Relays

Piece	Ref.	Type of Relay	Front Spring Ref.	Rear Spring Ref.	Dimensions				Drawing Reference
					"W"	"X"	"Y"	"Z"	
172589	**E**	DN-11 and DN-12, 4 Pt.	12	11	4¼″	4¼″	6¼″	6¼″	12404–27
172590	**Ea**	DN-11 and DN-12, 6 Pt.	12	11	5½″	4¼″	7½″	6¼″	12404–27
172591	**Eb**	DN-11 and DN-12, 8 Pt.	12	11	7½″	4¼″	9½″	6¼″	12404–27
172592	**Ec**	DN-11 and DN-12, 10 Pt.	12	11	9½″	4¼″	11½″	6¼″	12404–27
172593	**Ed**	DX-13 Interlocking	12	11	10¼″	4⅜″	12¼″	6⅜″	12404–27
172594	**Ee**	DP-14, 2N and 2R Polar	11	11	5⅜″	5¾″	7⅜″	7¾″	12404–27
172595	**Ef**	DT-10 and DP-14, 4N and 4R Polar	11	11	7″	7″	9″	9″	12404–27
173413	**Eg**	DP-14, 6N and 6R Polar and DP-17	11	11	9″	6″	11″	8″	12404–27
173439	**Eh**	Model 13 Rd. Base, 4 Pt.	11	11	$3\frac{17}{32}$″	$3\frac{17}{32}$″	$5\frac{17}{32}$″	$5\frac{17}{32}$″	12404–27
173441	**Ej**	Model 13 Sq. Base, 6 Pt.	11	11	5¼″	6⅛″	7¼″	8⅛″	12404–27
173443	**Ek**	Model 13 Sq. Base, 4 Pt.	11	11	4⅛″	6″	6⅛″	8″	12404–27
173445	**Em**	For Ref. A	11	11	$4\frac{9}{16}$″	5⅛″	$6\frac{9}{16}$″	7⅛″	12404–27

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS (Continued)

See Tabulation preceding this plate for assistance in selection of type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Type of Relay	Front Spring Ref.	Rear Spring Ref.	Dimensions "W"	Dimensions "X"	Dimensions "Y"	Dimensions "Z"	Drawing Reference
173835	**En**	Model 12, 2N and 2R, Polarized	11	11	4 7/8"	5 1/2"	6 7/8"	7 1/2"	12404–27
173837	**Ep**	Model 12, 4N and 4R Polarized	11	11	5 1/2"	5 1/2"	7 1/2"	7 1/2"	12404–27
174249	**Eq**	DN-10, 4 Pt.	12	11	4 3/8"	3 5/8"	6 3/8"	5 5/8"	12404–27
176161	**Er**	Model 13 Sq. Base, 8 Pt.	11	11	7 3/4"	5 1/8"	9 3/4"	7 1/8"	12404–27
176197	**Es**	Model 12 Int. Relay	11	11	9 3/4"	4 5/8"	11 3/4"	6 5/8"	12404–27

Wall Type Shock Absorber Spring Base complete, for application to D. C. Relays

Piece	Ref.	Type of Relay	"V" Dim.	Base Ref.	Wall Bracket Ref.	Drawing Reference
173292	**F**	DN-11 and DN-12, 4 Pt.	4 1/4"	E	13	12404–28
173293	**Fa**	DN-11 and DN-12, 6 Pt.	5 1/2"	Ea	13	12404–28
173294	**Fb**	DN-11 and DN-12, 8 Pt.	7 1/2"	Eb	13	12404–28
173295	**Fc**	DN-11 and DN-12, 10 Pt.	9 1/2"	Ec	13	12404–28
173296	**Fd**	DX-13 Interlocking	10 1/4"	Ed	13a	12404–28
173297	**Fe**	DP-14, 2N and 2R Polar Contacts	5 3/8"	Ee	13b	12404–28
173298	**Ff**	DT-10 Time Element and DP-14, 4N and 4R Polar Contacts	7"	Ef	13c	12404–28

PLATE E-5030

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS (Continued)

See Tabulation preceding this plate for assistance in selection of type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Type of Relay	"V" Dim.	Base Ref.	Wall Bracket Ref.	Drawing Reference
173530	**Fg**	DP-14, 6N and 6R Polar and DP-17	9″	Eg	13d	12404–28
173869	**Fh**	Model 12 Polarized, 2N and 2R Polar Contacts	4 7/8″	En	13e	12404–28
173870	**Fj**	Model 12 Polarized, 4N and 4R Polar Contacts	5 1/2″	Ep	13e	12404–28
173871	**Fk**	Model 13 Sq. Base, 6 Pt.	5 1/4″	Ej	13f	12404–28
173987	**Fm**	Model 13 Rd. Base, 4 Pt.	3 17/32″	Eh	13g	12404–28
173989	**Fn**	For Ref. Aa	4 9/16″	Em	13h	12404–28
174040	**Fp**	Model 13 Sq. Base, 4 Pt.	4 1/8″	Ek	13d	12404–28
174251	**Fq**	DN-10, 4 Pt.	4 3/8″	Eq	13j	12404–28
176201	**Fr**	Model 13, 8 Pt. Sq. Base	7 3/4″	Es	13k	12404–28
176162	**Fs**	Model 12, Interlocking	9 3/4″	Et	13m	12404–28
176163	**Ft**	Model 13, 8 Pt. and 10 Pt. (Relays without Studs)	7 3/4″	B	13k	12404–28
176198	**Fu**	Model 12, Interlocking (Relays without Studs)	9 3/4″	C	13m	12404–28

Piece	Ref.	Description	Drawing Reference
177470	**G**	**Shock Absorber Base** complete as shown for applying to "DN-11" Lightout Relay (4 Pt.) with Rectifier	12404–29
138250	**H**	**Shock Absorber Base** complete as shown in full lines for applying to "SV-20" and "SV-21" A.C. Relays	12404–18

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS (Continued)

See Tabulation preceding this plate for assistance in selection of type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
137819	**J**	**Shock Absorber Base** complete as shown in full lines for applying to Model 15 Vane Type Relay and "SV-30," "SV-31" and "SV-32" A C. Relays	12404–16
137907	**K**	**Shock Absorber Base** complete as shown in full lines for applying to "SLV-13" A.C. Vane Type Relay	12404–17
152381	**M**	**Shock Absorber Spring** with Bolt, Nut and Washers (Inc. 1-18, 1-19, 1-20 and 2-21 spaced 3″ centers) for applying to "ANL-30" A.C. Relay	12404–22
163849	**N**	**Shock Absorber Base** complete as shown in full lines for applying to "TV-40" and "TV-30" A.C. Relays	12404–25
410218	**2**	**Shock Absorber Spring** (Used when Shock Absorber Base is not desired).	
	3	**Plate with Four Studs** for Ref. Ab (without Clips)	9999–651
156005	**4**	**Clip** with Screw Ref. 5	10914–160
	5	**Machine Screw No. 10-30x1/4″** Rd. Hd. S. (Cad. Pl.) with Washer Ref. 5a and No. 10 Plain S. Lock Washer (1/8″x3/64″) (Cad. Pl.) for Ref. 4.	
53	**5a**	**Washer,** for Ref. 5	7828–5
	6	**Plate with Four Studs and Screw** Ref. 7 for Ref. B	9999–363
	7	**Machine Screw No. 14-24x1/2″** Rd. Hd. S. (Cad. Pl.) with Nut Ref. 7a for Ref. 6.	
29103	**7a**	**Nut,** for Ref. 7	8109–194
	8	**Plate with Four Studs and Two Screws** Ref. 7 for Ref. C	9999–354
151538	**9**	**Shock Absorber Spring only,** for Ref. D	8735–656

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS (Continued)

See Tabulation preceding this plate for assistance in selection of type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	10	**Tap Bolt,** 1/4″-20x5/8″ Hex. Hd. with Washers Ref. 10a, 1/4″ Plain S. Lock Washer (1/8″x1/16″) and 1/4″-20 Hex. Nut (Cad. Pl.) for Ref. 9.	
29102	**10a**	**Washer only,** for Ref. 9	7828–139
172580	**11**	**Spring only** No. 13 Gauge Ph. Bz. (N. P.) with Eyelet Ref. 12a	8124–242
172581	**12**	**Spring only** No. 15 Gauge Ph. Bz. (N. P.) with Eyelet Ref. 12a	8124–242
169921	**12a**	**Eyelet** for fastening Refs. 11 and 12 to Plate	12579–4
173276	**13**	**Wall Bracket** for Refs. F, Fa, Fb and Fc	10914–342
173277	**13a**	**Wall Bracket** for Ref. Fd	10914–342
173278	**13b**	**Wall Bracket** for Ref. Fe	10914–342
173279	**13c**	**Wall Bracket** for Ref. Ff	10914–342
173531	**13d**	**Wall Bracket** for Refs. Fg and Fp	10914–342
173868	**13e**	**Wall Bracket** for Refs. Fh and Fj	10914–342
173841	**13f**	**Wall Bracket** for Ref. Fk	10914–342
173986	**13g**	**Wall Bracket** for Ref. Fm	10914–342
173988	**13h**	**Wall Bracket** for Ref. Fn	10914–342
174250	**13j**	**Wall Bracket** for Ref. Fq	10914–342
176352	**13k**	**Wall Bracket** for Refs. Fr and Ft	10914–342
176200	**13m**	**Wall Bracket** for Refs. Fs and Fu	10914–342
	14	**Machine Screw, No. 6-40x1/4″** Rd. Hd. S. (Cad. Pl.).	

UNION SWITCH & SIGNAL CO.

SHOCK ABSORBER SPRING BASES FOR D. C. AND A. C. RELAYS (Continued)

See Tabulation preceding this plate for assistance in selection of type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	15	**Machine Screw, No. 10-30x5/8″** Flat Hd. S. with No. 10-30 Hex. Nut.	
	16	**Machine Screw, No. 4-48x1/4″** Rd. Hd. S. (Cad. Pl.).	
135775	**17**	**Spring only, No. 12** Gauge Ph. Bz. (N. P.) with eyelet Ref. 17a	8124–218
135773	**17a**	**Eyelet** for fastening Ref. 17 to Plate	12579–3
	18	**Machine Screw, No. 8-36x1″** with Washer Ref. 18a, Washer Ref. 18b, Nut Ref. 18d and No. 10 Plain S. Lock Washer (1/16″x1/16″) (Cad. Pl.).	
152389	**18a**	**Washer**	7826–249
122842	**18b**	**Washer**	8078–880
152382	**18c**	**Washer**	7826–249
94344	**18d**	**Nut**	8265–70
	19	**Machine Screw, No. 8-36x1 1/8″** Fil. Hd. S. with Washer Ref. 18a, Washer Ref. 18c, Nut Ref. 18d, Washer Ref. 18b and No. 10 Pl. S. Lock Washer (1/16″x1/16″) (Cad. Pl.).	
152379	**20**	**Relay Support**	8735–666
413456	**21**	**Spring**	411675
148052	**22**	**Stud** (For use with Refs. 3, 6 and 8)	8114–631

Plug Couplers for Relays and Styles "H" and "H-2" Searchlight Signals

Plug Couplers permit the removal and replacement of relays or operating units without disconnecting any of the field wires. These couplers are made of moulded bakelite and fitted with terminal posts, spaced and marked the same as the terminals on the regular operating unit. Attached to the underside of each terminal post and housed inside individual recesses in the bakelite body are spring clip receptacles which make contact with the standard terminal posts on the operating unit. Ordering references are available as follows.

A.C. Relays—E-1200
D.C. Relays—E-5035 and up
Searchlight Signals—B-2890
Coded Track Circuit Equipment—W-75

Advantages obtainable with these devices are:

1. Materially shortens the time required to remove from service and replace operating units, thus preventing or shortening train delay time, especially important in congested territories.
2. Eliminates any possibility of replacing field wires on wrong terminal when changing operating units, as wires are not removed from the plug coupler.
3. Can be applied to signals or relays now in service with little or no change in the operating units. Wires are simply removed from the present terminal posts and placed on corresponding posts on the plug coupler.
4. Plug coupler spring clips are so designed that ample contact pressure will be maintained.
5. Plug coupler is self-aligning and uniform contact is made on all posts.
6. Terminal binding posts on plug couplers are equipped with an insulated nut which prevents grounding or short circuiting posts when the coupler is removed from the operating unit.
7. Relay testing and wire checking in field are simplified.

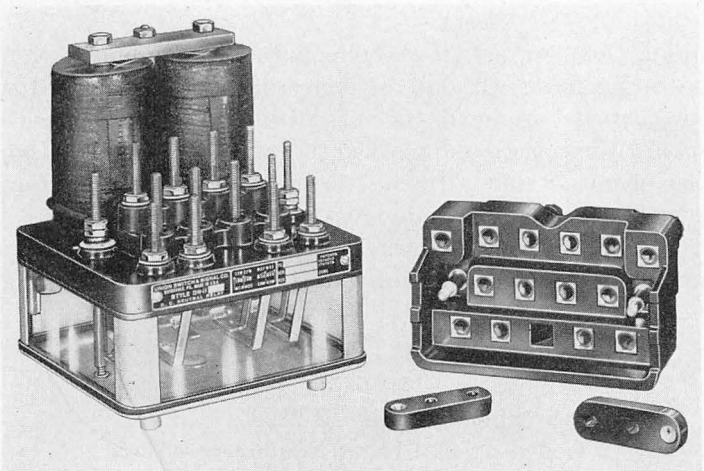


Fig. 1. At left, Style DN-11 relay stripped to receive plug coupler. At right, plug coupler and clampling pieces.

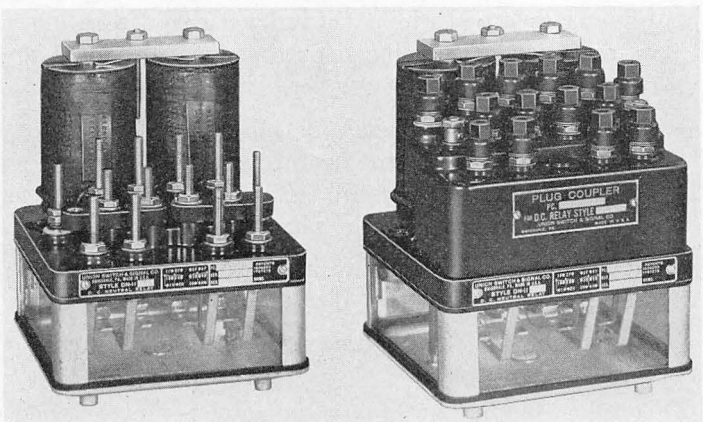


Fig. 2. At left, clamping pieces applied to Style DN-11 relay. At right, plug coupler in place on relay.

In most cases these plug couplers can be applied to Union relays and operating units in service, simply by removing terminal nuts and washers as specified, and transferring the field connections to the corresponding terminals of the plug coupler. In the larger plug couplers for D.C. relays, two moulded clamping pieces, shown in lower right corner of Fig. 1, are applied to the relay top plate as shown in the left view, Fig. 2. Clamping screws such as References 15 and 25, Plate E-5035, are assembled to the coupler as shown in the right hand view Fig. 1 so that by alternately turning them clockwise into the clamping pieces the coupler is positively drawn down to its seat, and turning counterclockwise will gradually unseat the coupler.

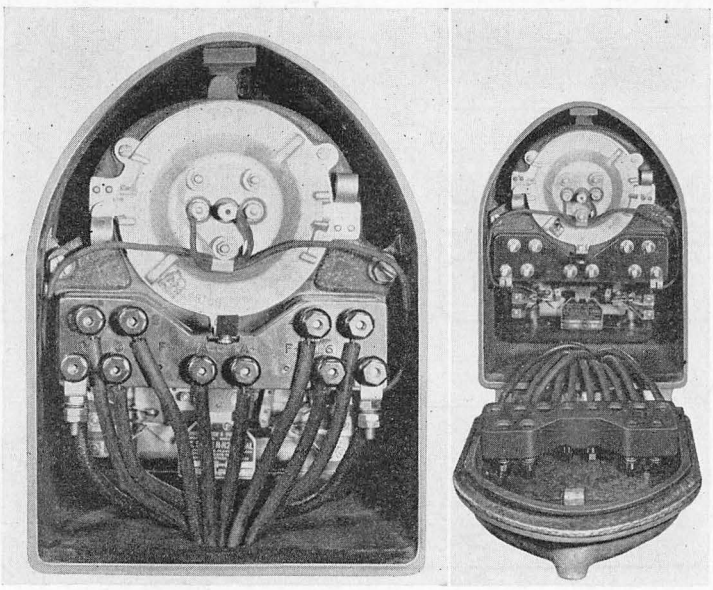
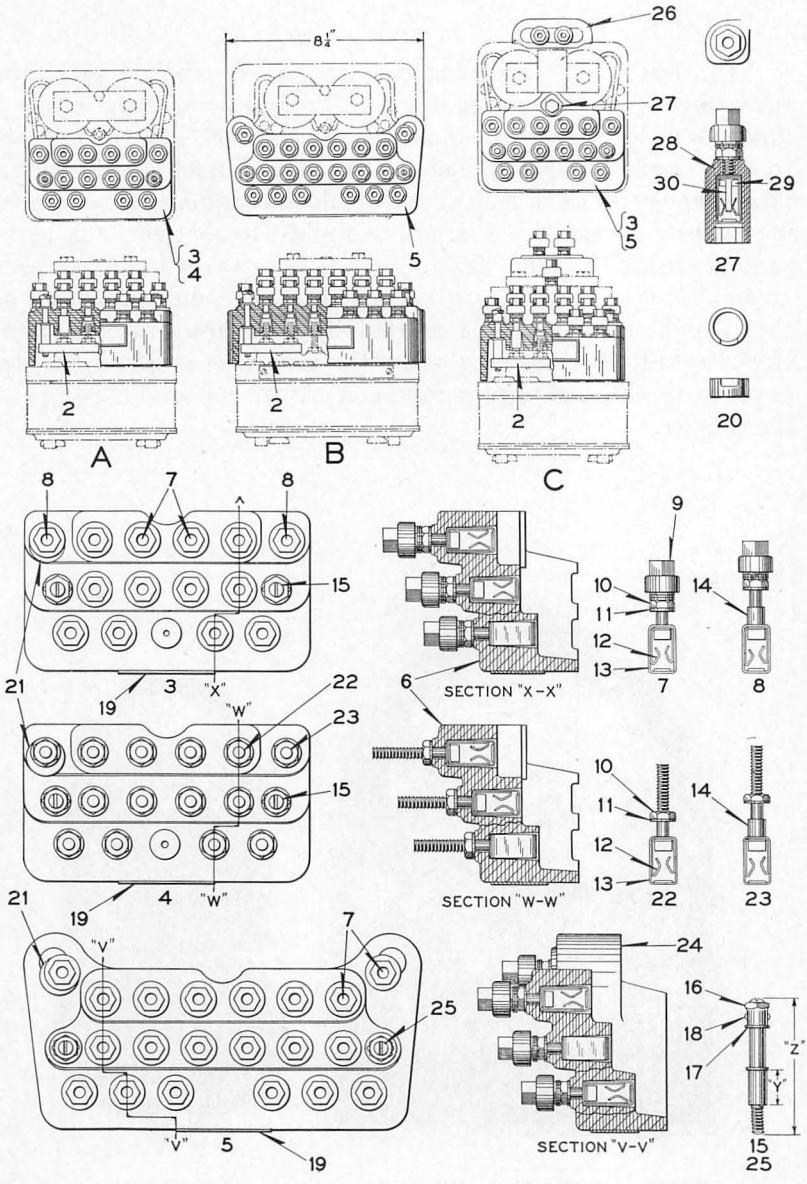


Fig. 3. Application of Plug Coupler to a Style H or H-2 Searchlight Signal. Small view at right shows plug coupler removed.



Plug Couplers for D. C. Relays

(4 and 6-Point "DN-11", "DN-12", "DN-18" and "DN-19")

Plug Couplers for D. C. Relays

(4 and 6-Point "DN-11", "DN-12", "DN-18" and "DN-19")

All Terminal Posts fitted with Insulated Nuts unless otherwise noted. Insulating Sleeves Ref. 20 for Nut Ref. 10 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
108879	**A**	**Plug Coupler Complete with Clamping Pieces** (Inc. 2-2 and 1-3) for 4-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays	C–16749–1
219430	**Aa**	**Plug Coupler Complete with Clamping Pieces** (Inc. 2-2 and 1-4) for 4-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays (No Terminal Nuts)	C–16749–1
221084	**B**	**Plug Coupler Complete with Clamping Pieces** (Inc. 2-2 and 1-5) for 6-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays	C–16749–4
226855	**C**	**Plug Couplers Complete with Clamping Pieces** (Inc. 2-2, 1-3, 1-26 and 1-27) for 4-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays having Resistor and Back Strap Terminals	C–16749–1
226609	**Ca**	**Plug Couplers Complete with Clamping Pieces** (Inc. 2-2, 1-3 and 1-26) for 4-Pt. "DN-11" "DN-12", "DN-18" and "DN-19" Relays having Back Strap Terminals	C–16749–1
226608	**Cb**	**Plug Couplers Complete with Clamping Pieces** (Inc. 2-2, 1-3 and 1-27) for 4-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays having Resistor Terminal	C–16749–1
226611	**Cc**	**Plug Couplers Complete with Clamping Pieces** (Inc. 2-2, 1-5 and 1-26) for 6-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays having Back Strap Terminals	C–16749–4
226610	**Cd**	**Plug Couplers Complete with Clamping Pieces** (Inc. 2-2, 1-5 and 1-27) for 6-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays having Resistor Terminal	C–16749–4
108875	**2**	**Clamping Piece** for Refs. A, Aa, B, C, Ca, Cb, Cc and Cd	12770–25
108878	**3**	**Plug Coupler with Insulated Nuts,** for Refs. A, C, Ca and Cb	C–16749–1
219391	**4**	**Plug Coupler** without Terminal Nuts, for Ref. Aa (Use nuts from relay posts)	C–16749–1

Plug Couplers for D. C. Relays

(4 and 6-Point "DN-11", "DN-12", "DN-18" and "DN-19")

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
221083	5	**Plug Coupler with Insulated Nuts,** for Refs. B, Cc and Cd	C–16749–4
108280	6	**Plug Coupler Body** for Refs. 3 and 4 (For 4-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays)	C–16750–1
	7	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-7a, 1-9, 2-10, 3-11, 2-12 and 1-13)	12451–
122489	7a	**Terminal Post Only**	8094–1192
	8	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs, Receptacle and Spacer** (Inc. 1-8a, 1-9, 2-10, 3-11, 2-12, 1-13 and 1-14)	12451–
199852	8a	**Terminal Post Only**	8094–2207
105713	9	**Insulated Nut**	12770–1
127260	10	**Nut**	8109–194
29102	11	**Washer**	7828–139
216193	12	**Contact Spring**	8385–2631
216192	13	**Receptacle**	11893–883
216194	14	**Spacer**	8350–856
	15	**Screw with Sleeve, Washers and Rivet** (Inc. 1-15a, 1-16, 2-17 and 1-18) "Y" dim. $\frac{49}{64}$", "Z" dim. $2\frac{49}{64}$". For Refs. 3 and 4	12471–
108877	15a	**Screw Only** ("Y" dim. $\frac{49}{64}$", "Z" dim. $2\frac{49}{64}$")	8190–300
108876	16	**Sleeve**	8350–946
216197	17	**Washer**	7828–401
54921	18	**Rivet**	10301–1
224740	19	**Name Plate**	8225–586
224689	20	**Insulating Sleeve** (for Nut Ref. 10)	8095–752

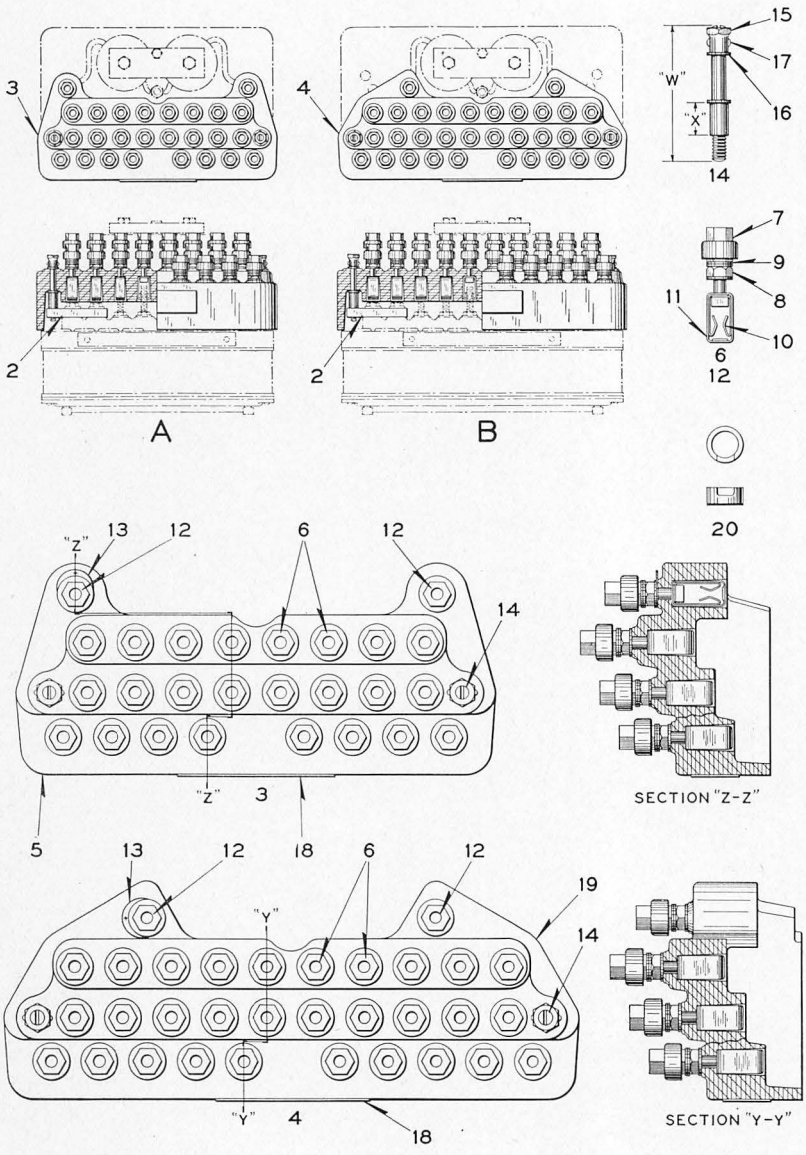
Plug Couplers for D. C. Relays

(4 and 6-Point "DN-11", "DN-12", "DN-18" and "DN-19")

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
142777	**21**	**Tag** (Orders should specify marking desired)	8988–75
	22	**Terminal Post with Nut, Washer, Contact Springs and Receptacle** (Inc. 1-8a, 1-10, 1-11, 2-12 and 1-13)	12451–
	23	**Terminal Post with Nut, Washer, Contact Springs, Receptacle and Spacer** (Inc. 1-23a, 1-10, 1-11, 2-12, 1-13 and 1-14)	12451–
130593	**23a**	**Terminal Post Only**	8094–1192
221225	**24**	**Plug Coupler Body** for Ref. 5 (For 6-Pt. "DN-11", "DN-12", "DN-18" and "DN-19" Relays)	C–16750–5
	25	**Screw with Sleeve, Washers and Rivet** (Inc. 1-25a, 1-16, 2-17 and 1-18) "Y" dim. $\frac{21}{32}$", "Z" dim. 2-$\frac{3}{4}$". For Ref. 5	12471–
221228	**25a**	**Screw Only** ("Y" dim. $\frac{21}{32}$", "Z" dim. 2-$\frac{3}{4}$")	8190–300
222179	**26**	**Plug Coupler Unit Complete** for rear terminals for Refs. C, Ca and Cc (For details refer to Ref. 2, Plate E-5035-2)	C–16749–6
226607	**27**	**Plug Coupler Unit Complete** for single terminal for Refs. C, Cb and Cd of this Plate and Ref. B of Plate E-5035-2	C-16749–17
226606	**28**	**Plug Coupler Body** for Ref. 27	12770–35
	29	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-7a, 1-9, 2-10, 3-11, 2-12, 1-13 and 1-30)	12451–
226411	**30**	**Contact Spring**	3385–2721



Plug Couplers for D. C. Relays

(8 and 10-Point "DN-11")

Plug Couplers for D. C. Relays

(8 and 10-Point "DN-11")

All Terminal Posts fitted with Insulated Nuts unless otherwise noted.
Insulating Sleeves Ref. 20 for Nut Ref. 8 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
223177	**A**	**Plug Coupler Complete with Clamping Pieces** (Inc. 2-2 and 1-3) for 8-Pt. "DN-11" Relays	C–16749–9
223175	**B**	**Plug Coupler Complete with Clamping Pieces** (Inc. 2-2 and 1-4) for 10-Pt. "DN-11" Relays	C–16749–8
108875	**2**	**Clamping Piece** for Refs. A and B	12770–25
223176	**3**	**Plug Coupler Complete** for Ref. A	C–16749–9
223174	**4**	**Plug Coupler Complete** for Ref. B	C–16749–8
223021	**5**	**Plug Coupler Body** for Ref. 3	C–16750–11
	6	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-6a, 1-7, 2-8, 3-9, 2-10 and 1-11)	12451–
122489	**6a**	**Terminal Post Only**	8094–1192
105713	**7**	**Insulated Nut**	12770–1
127260	**8**	**Nut**	8109–194
29102	**9**	**Washer**	7828–139
216193	**10**	**Contact Spring for Ref. 6**	8385–2631
222957	**10a**	**Contact Spring** for Ref. 12	8385–2631
216192	**11**	**Receptacle** for Ref. 6	11893–883
222956	**11a**	**Receptacle** for Ref. 12	11893–883
	12	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-6a, 1-7, 2-8, 3-9, 2-10a and 1-11a)	12451–
142777	**13**	**Tag** (Orders should specify marking desired)	8988–75
	14	**Screw with Sleeve, Washers and Rivet** (Inc. 1-14a, 1-15, 2-16 and 1-17) "W" dim. 2-¾", "X" dim. $\frac{21}{32}$" for Refs. 3 and 4	12471–
221228	**14a**	**Screw Only** ("W" dim. 2-¾", "X" dim. $\frac{21}{32}$")	8190–300

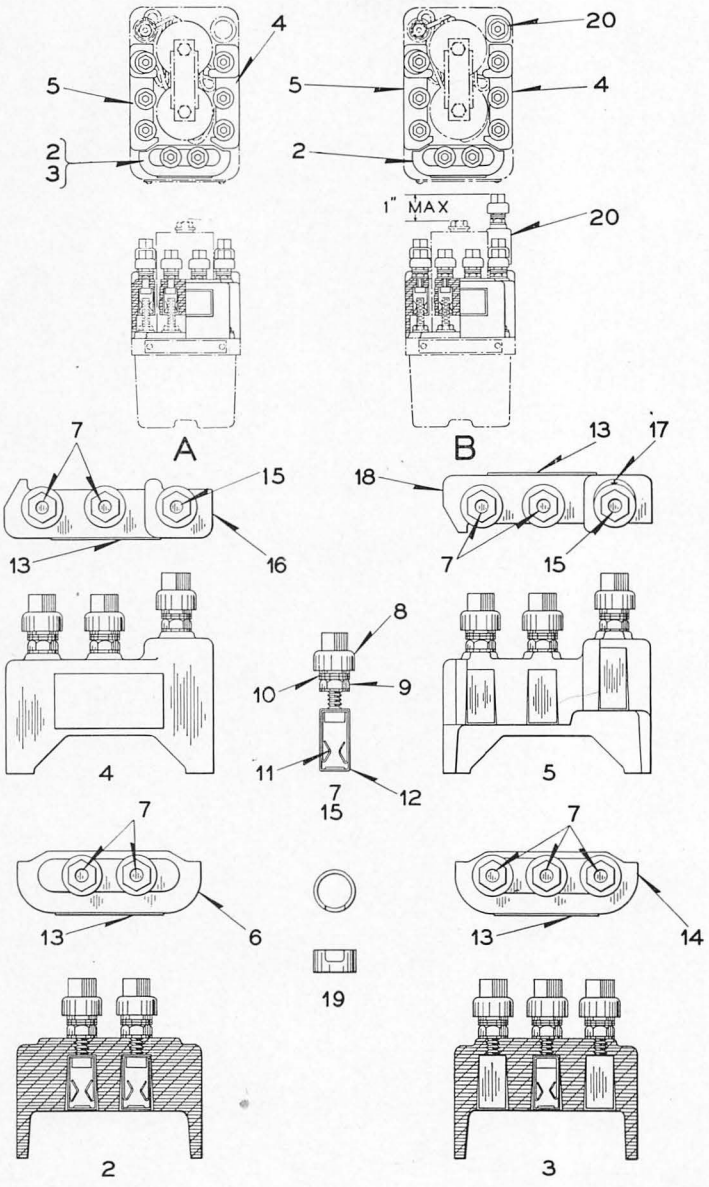
Plug Couplers for D. C. Relays

(8 and 10-Point "DN-11")

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
108876	**15**	**Sleeve**	8350–946
216197	**16**	**Washer**	7828–401
54921	**17**	**Rivet**	10301–1
224740	**18**	**Name Plate**	8225–586
222976	**19**	**Plug Coupler Body** for Ref. 4	C–16750–10
224689	**20**	**Insulating Sleeve** (for Nut Ref. 8)	8095–752



Plug Couplers for D. C. Relays

("DN-22" Shipped Subsequent to July 1941 Having 8 or 9 Terminal Post Connections)

Plug Couplers for D. C. Relays

("DN-22" Shipped Subsequent to July 1941 Having 8 or 9 Terminal Post Connections)

All Terminal Posts fitted with Insulated Nuts unless otherwise noted.
Insulating Sleeves Ref. 19 for Nut Ref. 9 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
222404	*A	**Plug Couplers Complete** (Inc. 1-2, 1-4 and 1-5) for "DN-22" Relay having 8 Terminal Post connections	C–16749–6
222405	*Aa	**Plug Couplers Complete** (Inc. 1-3, 1-4 and 1-5) for "DN-22" Relay having 9 Terminal Post connections	C–16749–6
226612	*B	**Plug Couplers Complete** (Inc. 1-2, 1-4, 1-5 and 1-20) for "DN-22" Relay having Resistor Terminal (9 Terminal Post connections including Resistor Terminal)	C–16749–6
		*Relays shipped prior to July 1941 were not designed for use with plug couplers. These Relays have coil connections on the rear terminal posts, and these must be relocated one terminal space forward. This change requires one each of references 21 and 22.	
222179	2	**Front Plug Coupler Complete** for Refs. A and B of this Plate and Refs. C, Ca and Cc of Plate E-5035	C–16749–6
222180	3	**Front Plug Coupler Complete** for Ref. Aa	C–16749–6
222181	4	**R.H. Plug Coupler Complete** for Refs. A, Aa and B	C–16749–7
222182	5	**L.H. Plug Coupler Complete** for Refs. A, Aa and B	C–16749–7
222173	6	**Plug Coupler Body** for Ref. 2	C–16750–6
	7	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-7a, 1-8, 2-9, 3-10, 2-11 and 1-12)	12451–
122489	7a	**Terminal Post Only**	8094–1192
105713	8	**Insulated Nut**	12770–1
127260	9	**Nut**	8109–194
29102	10	**Washer**	7828–139
216193	11	**Contact Spring** for Ref. 7	8385–2631

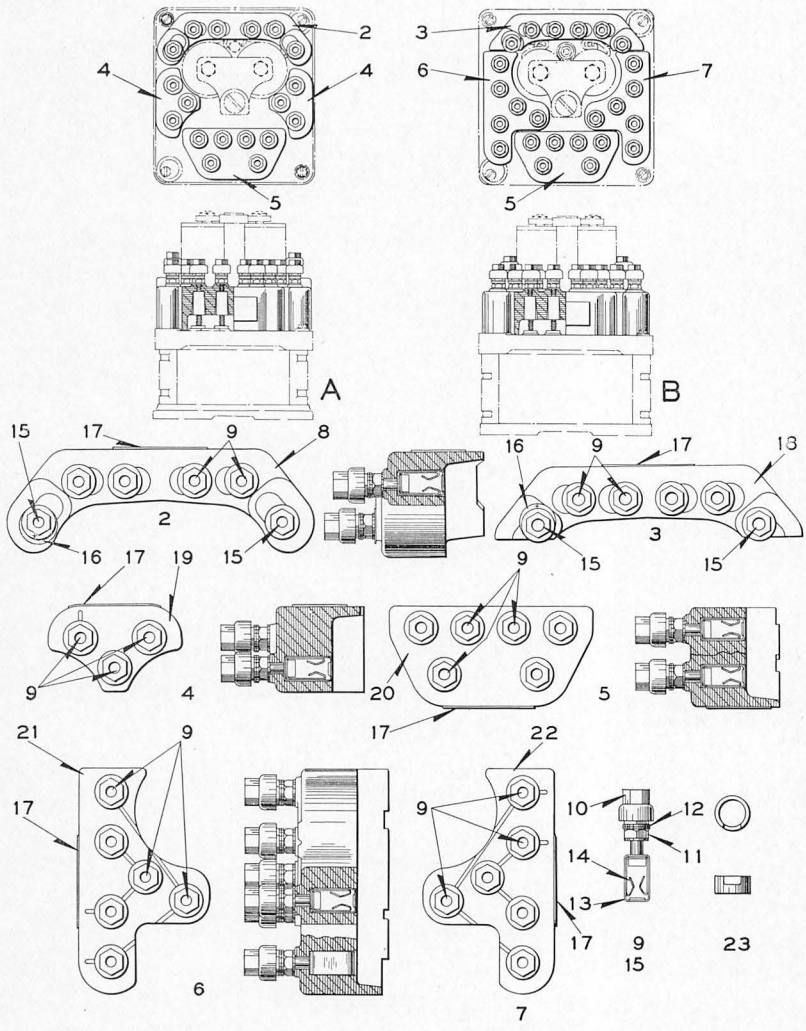
Plug Couplers for D. C. Relays

("DN-22" Shipped Subsequent to July 1941 Having 8 or 9 Terminal Post Connections)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
222957	**11a**	**Contact Spring** for Ref. 15	8385–2631
216192	**12**	**Receptacle** for Ref. 7	11893–883
222956	**12a**	**Receptacle** for Ref. 15	11893–883
224741	**13**	**Name Plate**	8225–586
222172	**14**	**Plug Coupler Body** for Ref. 3	C–16750–6
	15	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-7a, 1-8, 2-9, 3-10, 2-11a and 1-12a)	12451–
222174	**16**	**Plug Coupler Body** for Ref. 4	C–16750–7
142777	**17**	**Tag** (Orders should specify marking desired)	8988–75
222175	**18**	**Plug Coupler Body** for Ref. 5	C–16750–7
224689	**19**	**Insulating Sleeve** (for Nut Ref. 9)	8095–752
226607	**20**	**Plug Coupler Unit Complete** for Single Terminal for Ref. B (For details refer to Ref. 27 of Plate E-5035)	C–16749–17
118271	†21	**Terminal Post** (Not Shown)	8094–1192
	†22	**Machine Screw,** No. 14-24x$\frac{7}{16}$" Fil. Hd. S. (Tin Pl.) with one Nut Ref. 22a, used as dummy post to close top plate opening (Not Shown).	
410442	†22a	**Nut** (Not Shown).	
		†To be used on Relays shipped prior to July 1941 in order to relocate coil connection so Plug Couplers can be used.	



Plug Couplers for D. C. Relays

(Model 12 Polarized)

Plug Couplers for D. C. Relays

(Model 12 Polarized)

All Terminal Posts fitted with Insulated Nuts unless otherwise noted.

Insulating Sleeves Ref. 23 for Nut Ref. 11 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
225291	**A**	**Plug Couplers Complete** (Inc. 1-2, 2-4 and 1-5) for Model 12 Polarized Relays having small size Top Plate as shown on Plate E-4825)	C–16749–16
225292	**B**	**Plug Couplers Complete** (Inc. 1-3, 1-5, 1-6 and 1-7) for Model 12 Polarized Relays having large size Top Plate as shown on Plates E-4826 and E-4830)	C–16749–16
225151	**2**	**Rear Plug Coupler** for Ref. A	C–16749–15
225288	**3**	**Rear Plug Coupler** for Ref. B	C–16749–15
225290	**4**	**Plug Coupler Complete** for Polar Contacts for Ref. A	C–16749–16
225289	**5**	**Plug Coupler Complete** for Neutral Contacts for Refs. A and B	C–16749–16
225149	**6**	**L.H. Plug Coupler Complete** for Polar Contacts for Ref. B	C–16749–14
225150	**7**	**R.H. Plug Coupler Complete** for Polar Contacts for Ref. B	C–16749–14
225142	**8**	**Plug Coupler Body** for Ref. 2	C–16750–16
	9	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-9a, 1-10, 2-11, 3-12, 1-13 and 2-14)	12451–
122489	**9a**	**Terminal Post Only**	8094–1192
105713	**10**	**Insulated Nut**	12770–1
127260	**11**	**Nut**	8109–194
29102	**12**	**Washer**	7828–139
216192	**13**	**Receptacle** for Ref. 9	11893–883
222956	**13a**	**Receptacle** for Ref. 15	11893–883
216193	**14**	**Contact Spring** for Ref. 9	8385–2631
222957	**14a**	**Contact Spring** for Ref. 15	8385–2631

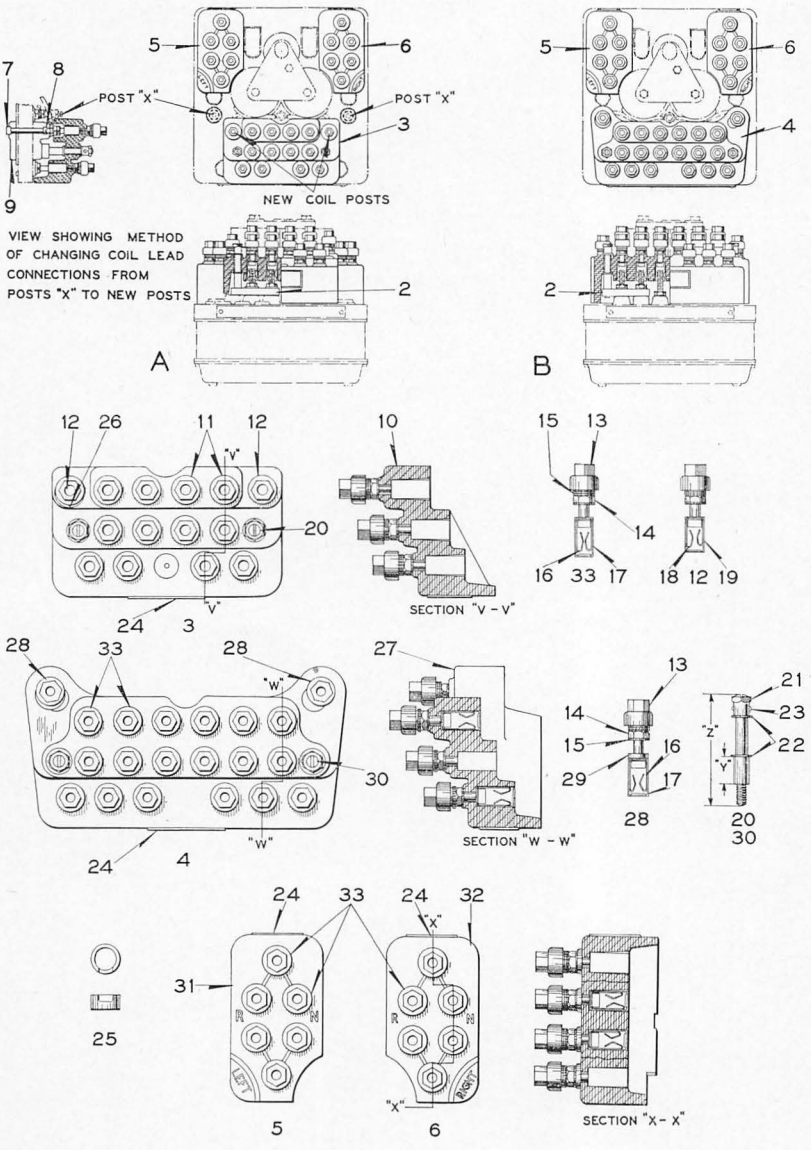
Plug Couplers for D. C. Relays

(Model 12 Polarized)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	15	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-9a, 1-10, 2-11, 3-12, 1-13a and 2-14a)	12451–
142777	**16**	**Tag** (Orders should specify marking desired)	8988–75
224741	**17**	**Name Plate**	8225–586
225144	**18**	**Plug Coupler Body** for Ref. 3	C–16750–17
225145	**19**	**Plug Coupler Body** for Ref. 4	C–16750–18
225146	**20**	**Plug Coupler Body** for Ref. 5	C–16750–19
225147	**21**	**Plug Coupler Body** for Ref. 6	C–16750–20
225148	**22**	**Plug Coupler Body** for Ref. 7	C–16750–21
224689	**23**	**Insulating Sleeve** (for Nut Ref. 11)	8095–752



Plug Couplers for D. C. Relays

(4 and 6-Point "DP-14" having 4N-4R Polar Contacts)

Plug Couplers for D. C. Relays

(4 and 6-Point "DP-14" having 4N-4R Polar Contacts)

All Terminal Posts fitted with Insulated Nuts unless otherwise noted. Insulating Sleeves Ref. 25 for Nut Ref. 14 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
219238	**A**	**Plug Coupler Complete with R.H. and L.H. Plug Couplers and Clamping Pieces** (Inc. 2-2, 1-3, 1-5 and 1-6) for "DP-14" Relays having 4N-4R Polar and 4F-4B Neutral Contacts (Relays supplied prior to September 1940, also require 2 each of Refs. 7, 8 and 9)	C–16749–2
221086	**B**	**Plug Coupler Complete with R.H. and L.H. Plug Couplers and Clamping Pieces** (Inc. 2-2, 1-4, 1-5 and 1-6) for "DP-14" Relays having 4N-4R Polar and 6F-6B Neutral Contacts	C–16749–5
108875	**2**	**Clamping Piece** for Refs. A and B	12770–25
219213	**3**	**Plug Coupler with Insulated Nuts,** for Ref. A	C–16749–2
221085	**4**	**Plug Coupler with Insulated Nuts,** for Ref. B	C–16749–5
219212	**5**	**L.H. Plug Coupler with Insulated Nuts,** for Polar Contacts for Refs. A and B	C–16749–2
219211	**6**	**R.H. Plug Coupler with Insulated Nuts,** for Polar Contacts for Refs. A and B	C–16749–2
210080	*** 7**	**Terminal Post**	8094–2207
72948	*** 8**	**Nut**	8109–383
161270	*** 9**	**Insulated Block**	8750–2348
		*To be used when changing coil leads from Posts "X" to new location.	
212012	**10**	**Plug Coupler Body** for Ref. 3 (For 4F-4B "DP-14" Neutral Contacts)	C–16750–9
	11	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-28a, 1-13, 2-14, 3-15, 2-16 and 1-17)	12451–
	12	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-28a, 1-13, 2-14, 3-15, 2-18 and 1-19)	12451–

Plug Couplers for D. C. Relays

(4 and 6-Point "DP-14" having 4N-4R Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
105713	**13**	**Insulated Nut**	12770–1
127260	**14**	**Nut**	8109–194
29102	**15**	**Washer**	7828–139
216193	**16**	**Contact Spring**	8385–2631
216192	**17**	**Receptacle**	11893–883
213265	**18**	**Contact Spring**	8385–2631
213371	**19**	**Receptacle**	11893–883
	20	**Screw with Sleeve, Washers and Rivet** (Inc. 1-20a, 1-21, 2-22 and 1-23) "Y" dim. $\frac{11}{16}$", "Z" dim. $2\frac{11}{16}$" for Ref. 3	12471–
217015	**20a**	**Screw Only** ("Y dim. $\frac{11}{16}$", "Z" dim. $2\frac{11}{16}$")	8190–300
108876	**21**	**Sleeve**	8350–946
216197	**22**	**Washer**	7828–401
54921	**23**	**Rivet**	10301–1
224740	**24**	**Name Plate**	8225–586
224689	**25**	**Insulating Sleeve** (for Nut Ref. 14)	8095–752
142777	**26**	**Tag** (Orders should specify marking desired)	8988–75
221226	**27**	**Plug Coupler Body** for Ref. 4 (For 6F-6B "DP-14" Neutral Contacts)	C–16750–5
	28	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-28a, 1-13, 2-14, 3-15, 2-16, 1-17 and 1-29)	12451–
186848	**28a**	**Terminal Post Only**	8094–2207
31068	**29**	**Washer**	7828–144
	30	**Screw with Sleeve, Washers and Rivet** (Inc. 1-30a, 1-21, 2-22 and 1-23) "Y" dim. $\frac{23}{32}$", "Z" dim. $2\frac{13}{16}$" for Ref. 4	12471–

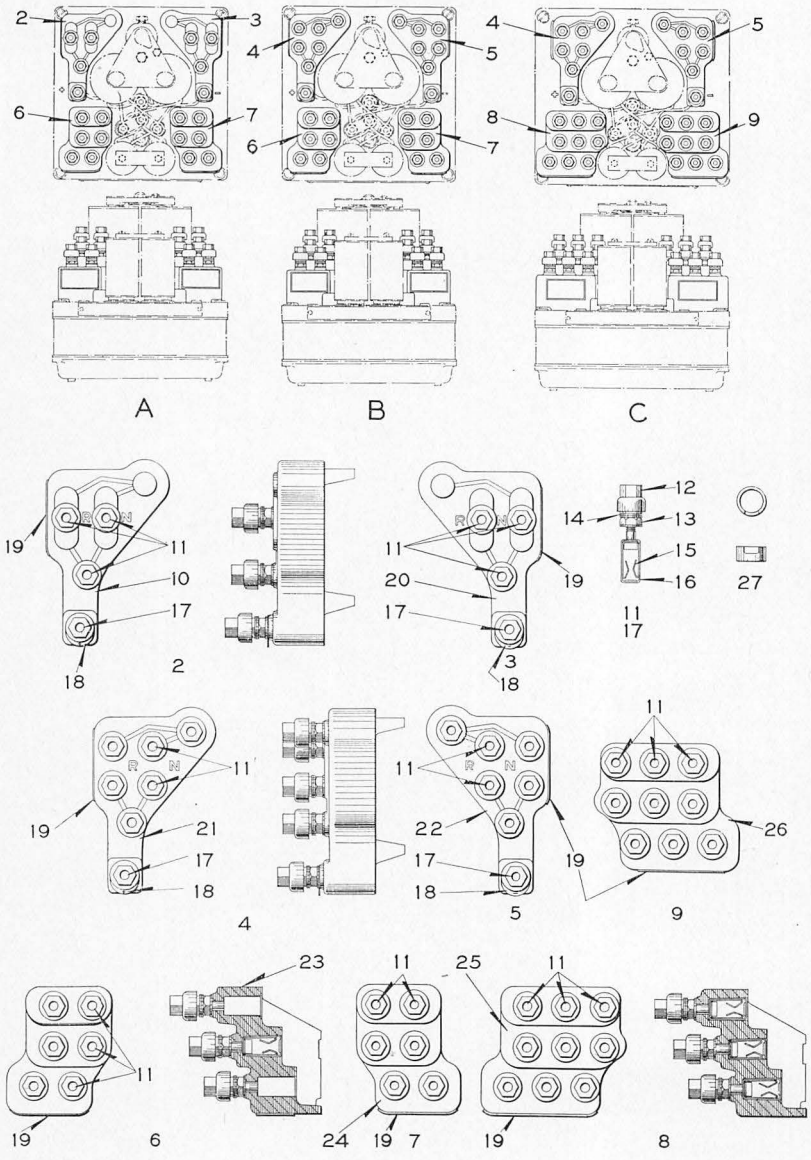
Plug Couplers for D. C. Relays

(4 and 6-Point "DP-14" having 4N-4R Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
221229	**30a**	**Screw Only** ("Y" dim. $\frac{23}{32}$", "Z" dim. $2\frac{13}{16}$")	8190–300
219208	**31**	**Plug Coupler Body** for Ref. 5 (For "DP-14" Polar Contacts)	C–16750–3
219207	**32**	**Plug Coupler Body** for Ref. 6 (For "DP-14" Polar Contacts)	C–16750–3
	33	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-33a, 1-13, 2-14, 3-15, 2-16 and 1-17)	12451–
122489	**33a**	**Terminal Post Only**	8094–1192



Plug Couplers for D. C. Relays

(4 and 6-Point "DP-20" and "DP-21" having 2N-2R and 4N-4R Polar Contacts)

Plug Couplers for D. C. Relays

(4 and 6-Point "DP-20" and "DP-21" having 2N-2R and 4N-4R Polar Contacts)

All Terminal Posts fitted with Insulated Nuts unless otherwise noted. Insulating Sleeves Ref. 27 for Nut Ref. 13 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
224221	*A	**Plug Couplers Complete** (Inc. 1-2, 1-3, 1-6 and 1-7) for "DP-20" and "DP-21" Relays having 2N-2R Polar and 4F-4B Neutral Contacts	C–16749–11
223849	*B	**Plug Couplers Complete** (Inc. 1-4, 1-5, 1-6 and 1-7) for "DP-20" and "DP-21" Relays having 4N-4R Polar and 4F-4B Neutral Contacts	C–16749–11
223848	*C	**Plug Couplers Complete** (Inc. 1-4, 1-5, 1-8 and 1-9) for "DP-20" and "DP-21" Relays having 4N-4R Polar and 6F-6B Neutral Contacts	C–16749–10
		*If Plug Coupling is required for auxiliary coil terminals, 2 of Ref. 27 Plate E-5035 should be ordered.	
224306	**2**	**L.H. Plug Coupler Complete** for Polar Contacts for Ref. A	C–16749–13
224307	**3**	**R.H. Plug Coupler Complete** for Polar Contacts for Ref. A	C–16749–13
223394	**4**	**L.H. Plug Coupler Complete** for Polar Contacts for Refs. B and C	C–16749–12
223395	**5**	**R.H. Plug Coupler Complete** for Polar Contacts for Refs. B and C	C–16749–12
223392	**6**	**L.H. Plug Coupler Complete** for Neutral Contacts for Refs. A and B	C–16749–11
223393	**7**	**R.H. Plug Coupler Complete** for Neutral Contacts for Refs. A and B	C–16749–11
223390	**8**	**L.H. Plug Coupler Complete** for Neutral Contacts for Ref. C	C–16749–10
223391	**9**	**R.H. Plug Coupler Complete** for Neutral Contacts for Ref. C	C–16749–10
224304	**10**	**Plug Coupler Body** for Ref. 2	C–16750–15
	11	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Spring and Receptacle** (Inc. 1-11a, 1-12, 2-13, 3-14, 2-15 and 1-16)	12451–

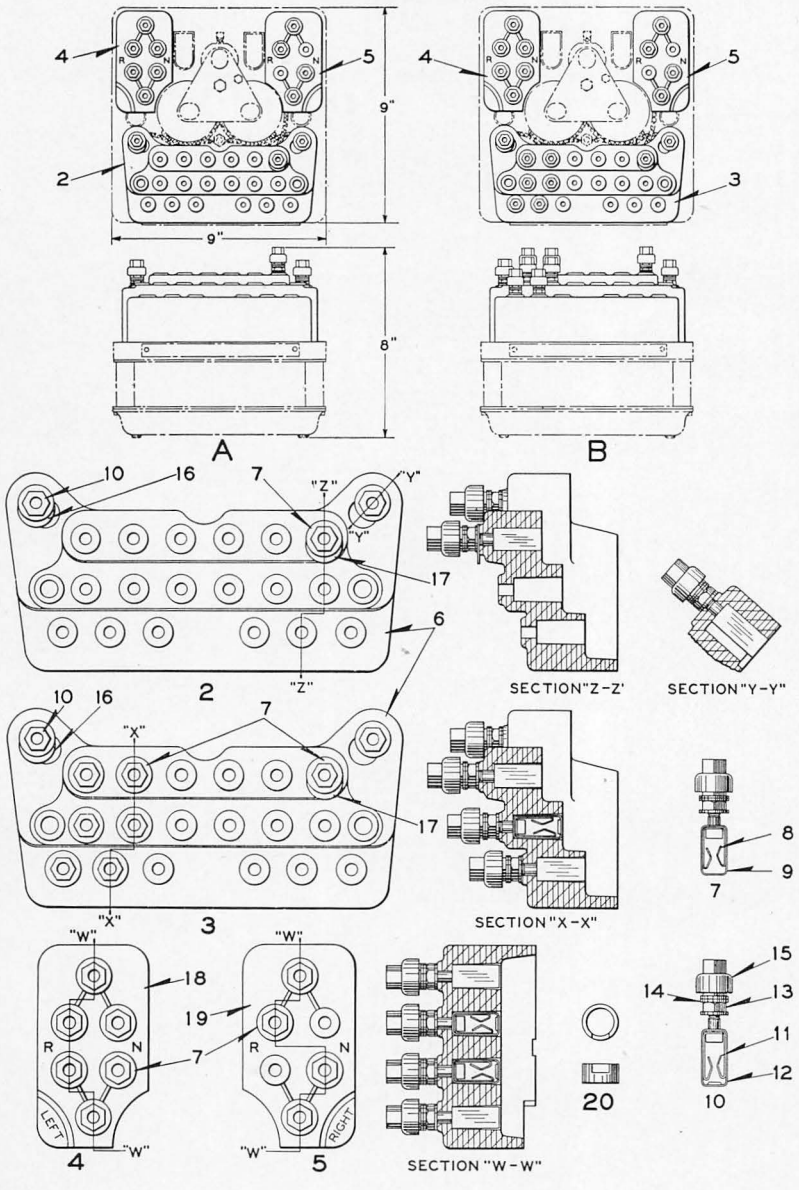
Plug Couplers for D. C. Relays

(4 and 6-Point "DP-20" and "DP-21" having 2N-2R and 4N-4R Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
122489	11a	**Terminal Post Only**	8094–1192
105713	12	**Insulated Nut**	12770–1
127260	13	**Nut**	8109–194
29102	14	**Washer**	7828–139
216193	15	**Contact Spring** for Ref. 11	8385–2631
222957	15a	**Contact Spring** for Ref. 17	8385–2631
216192	16	**Receptacle** for Ref. 11	11893–883
222956	16a	**Receptacle** for Ref. 17	11893–883
	17	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-11a, 1-12, 2-13, 3-14, 2-15a and 1-16a)	12451–
142777	18	**Tag** (Orders should specify marking desired)	8988–75
224741	19	**Name Plate**	8225–586
224305	20	**Plug Coupler Body** for Ref. 3	C–16750–15
223386	21	**Plug Coupler Body** for Ref. 4	C–16750–14
223387	22	**Plug Coupler Body** for Ref. 5	C–16750–14
223388	23	**Plug Coupler Body** for Ref. 6	C–16750–8
223389	24	**Plug Coupler Body** for Ref. 7	C–16750–8
223385	25	**Plug Coupler Body** for Ref. 8	C–16750–13
223384	26	**Plug Coupler Body** for Ref. 9	C–16750–12
224689	27	**Insulating Sleeve** (for Nut Ref. 13)	8095–752



Plug Couplers for D. C. Relays

("DP-25" Having 4N-4R Polar Contacts)

Plug Couplers for D. C. Relays

("DP-25" Having 4N-4R Polar Contacts)

All Terminal Posts fitted with Insulated Nuts unless otherwise noted.

Insulating Sleeves Ref. 20 for Nut Ref. 13 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
232413	**A**	**Plug Couplers Complete** (Inc. 1-2, 1-4 and 1-5) for "DP-25" Relays having Standard Contacts.....	C–16749–20
232414	**B**	**Plug Couplers Complete** (Inc. 1-3, 1-4 and 1-5) for "DP-25" Relays having Standard Contacts and 2F-2B extra Neutral Contacts..... Note: Standard Contact arrangement of "DP-25" Relays is 1F(MHD)-OB Neutral and 4N-4R Polar.	C–16749–20
232411	**2**	**Plug Coupler with Insulated Nuts,** for Ref. A.....	C–16749–20
232412	**3**	**Plug Coupler with Insulated Nuts,** for Ref. B.....	C–16749–20
219212	**4**	**L. H. Plug Coupler** with Insulated Nuts, for Polar Contacts for Refs. A and B.....	C–16749–2
228694	**5**	**R. H. Plug Coupler** with Insulated Nuts, for Polar Contacts for Refs. A and B.....	C–16749–19
229235	**6**	**Plug Coupler Body** for Refs. 2 and 3.....	C–16750–5
	7	**Terminal Post** with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle (Inc. 1-7a, 2-8, 1-9, 2-13, 3-14 and 1-15).....	12451–
122489	**7a**	**Terminal Post only**.....	8094–1192
216193	**8**	**Contact Spring**.....	8385–2631
216192	**9**	**Receptacle**.....	11893–883
	10	**Terminal Post** with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle (Inc. 1-7a, 2-11, 1-12, 2-13, 3-14 and 1-15).....	12451–
222957	**11**	**Contact Spring**.....	8385–2631
222956	**12**	**Receptacle**.....	11893–883
127260	**13**	**Nut**.....	8109–194
29102	**14**	**Washer**.....	7828–139
105713	**15**	**Insulated Nut**.....	12770–1

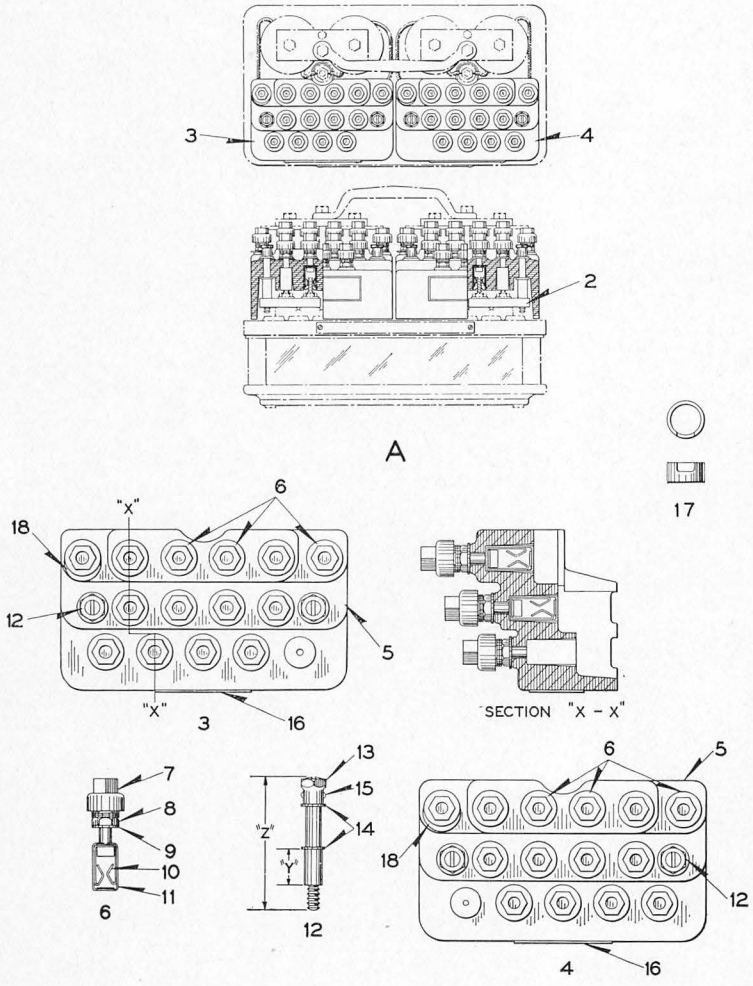
Plug Couplers for D. C. Relays

("DP-25" Having 4N-4R Polar Contacts)

(**Continued**)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
142777	**16**	**White Tag** (Orders should specify marking desired).	8988–75
107232	**17**	**Red Tag** (Orders should specify marking desired)...	8988–53
219208	**18**	**Plug Coupler Body** for Ref. 4.....	C–16750–3
228696	**19**	**Plug Coupler Body** for Ref. 5.....	C–16750–3
224689	**20**	**Insulating Sleeve** (for Nut Ref. 13).....	8095–752



Plug Couplers for D. C. Relays

("DX-13" Interlocking)

Plug Couplers for D. C. Relays

("DX-13" Interlocking)

All Terminal Posts fitted with Insulated Nuts unless otherwise noted.

Insulating Sleeves Ref. 17 for Nut Ref. 8 are not included with Plug Couplers and if desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
221082	**A**	**L.H. and R.H. Plug Couplers Complete with Clamping Pieces** (Inc. 4-2, 1-3 and 1-4) for "DX-13" Interlocking Relay	C–16749–3
108875	**2**	**Clamping Piece** for Ref. A	12770–25
221081	**3**	**L.H. Plug Coupler with Insulated Nuts** for Ref. A	C–16749–3
221230	**4**	**R.H. Plug Coupler with Insulated Nuts** for Ref. A	C–16749–3
221227	**5**	**Plug Coupler Body** for Refs. 3 and 4 (Orders should specify whether for L.H. or R.H. so proper holes can be drilled through)	C–16750–4
	6	**Terminal Post with Nuts, Washers, Insulated Nut, Contact Springs and Receptacle** (Inc. 1-6a, 1-7, 2-8, 3-9, 2-10 and 1-11)	12451–
122489	**6a**	**Terminal Post Only**	8094–1192
105713	**7**	**Insulated Nut**	12770–1
127260	**8**	**Nut**	8109–194
29102	**9**	**Washer**	7828–139
216193	**10**	**Contact Spring**	8385–2631
216192	**11**	**Receptacle**	11893–883
	12	**Screw with Sleeve, Washers and Rivet** (Inc. 1-12a, 1-13, 2-14 and 1-15) "Y" dim. $\frac{49}{64}$", "Z" dim. $2\frac{49}{64}$"	12471–
108877	**12a**	**Screw Only** ("Y" dim. $\frac{49}{64}$", "Z" dim. $2\frac{49}{64}$")	8190–300
108876	**13**	**Sleeve**	8350–946
216197	**14**	**Washer**	7828–401
54921	**15**	**Rivet**	10301–1
224740	**16**	**Name Plate**	8225–586
224689	**17**	**Insulating Sleeve** (for Nut Ref. 8)	8095–752
142777	**18**	**Tag** (Orders should specify marking desired)	8988–75

Section

E

Supplement 2

Relays, Indicators and Electric Locks

MODEL 12 D.C.
INTERLOCKING RELAY
AND
STYLE "NF" D.C.
FLASHER RELAY

(Revised July, 1931; Supersedes Issues of May, 1924 and May, 1927)

Union Switch & Signal Co.
Swissvale, Pa.

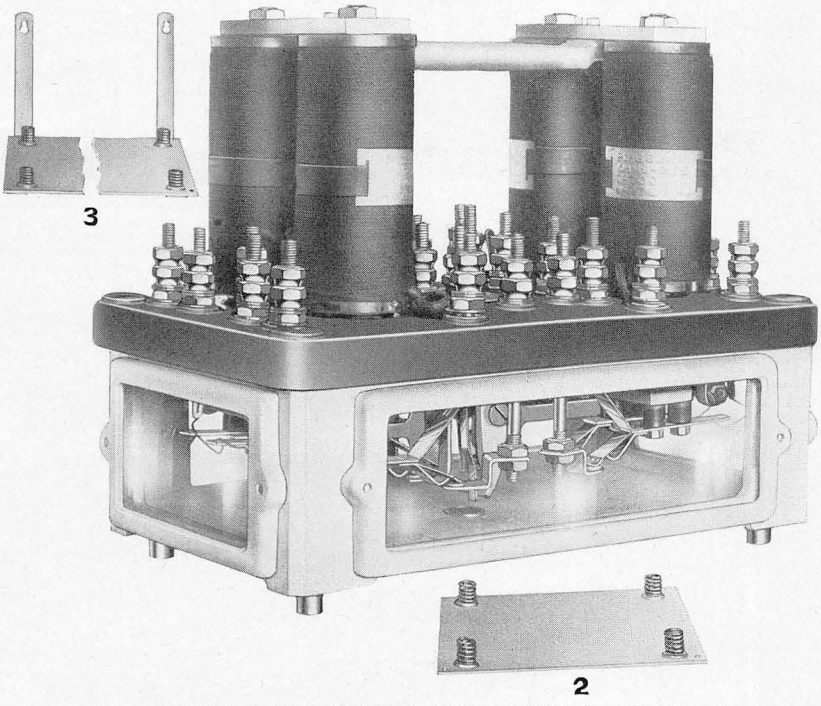
Remove Staple Before Filing Pages in Loose Leaf Cover

July, 1931

Printed in U. S. A.

PLATE E-5040

UNION SWITCH & SIGNAL CO.



HEIGHT $9\frac{3}{16}$", WIDTH $6\frac{13}{16}$", LENGTH $11\frac{7}{8}$"

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY

The top plate is of moulded insulating material. The pole pieces, locking pawl, and contact posts are rigidly fixed to the top plate. All terminal posts and insulation conform to A. R. A. Standards. The magnet coils may be replaced without affecting the adjustment of the relay.

In addition to the contact arrangements listed on the opposite page, any combination not requiring more than four contact fingers and six contacts on each side can be furnished.

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY

Unless otherwise specified in the order, relays will be furnished with silver to graphite front contacts and silver to silver back contacts.

High Voltage Contacts can be supplied when required. Orders should specify the resistance to which each pair of magnets is to be wound.

For Details see Plates E-5045 and E-5046

For Style "DX-13" Interlocking Relay refer to Plate E-5100

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Direct Current Enclosed Model 12 Interlocking Relay,** four front and two back contacts for each pair of magnets, with Shock Absorber Springs Ref. 2 for Shelf Mounting	C–8121–6
	A-1	**Direct Current Enclosed Model 12 Interlocking Relay,** two front and four back contacts for each pair of magnets, with Shock Absorber Springs Ref. 2 for Shelf Mounting	C–8121–6
	A-2	**Direct Current Enclosed Model 12 Interlocking Relay,** three front and three back contacts for each pair of magnets, with Shock Absorber Springs Ref. 2 for Shelf Mounting	C–8121–6
	A-3	**Direct Current Enclosed Model 12 Interlocking Relay,** four front and two back contacts for each pair of magnets, with Shock Absorber Springs Ref. 3 for Wall Mounting	C–8121–6
	A-4	**Direct Current Enclosed Model 12 Interlocking Relay,** two front and four back contacts for each pair of magnets, with Shock Absorber Springs Ref. 3 for Wall Mounting	C–8121–6
	A-5	**Direct Current Enclosed Model 12 Interlocking Relay,** three front and three back contacts for each pair of magnets, with Shock Absorber Springs Ref. 3 for Wall Mounting	C–8121–6
	B	**Direct Current Enclosed Model 12 Interlocking Relay,** four front and two back contacts for each pair of magnets (one of the front contacts on each side for Automatic Flagman, see Refs. G and H, Plate E-5046) with Shock Absorber Springs Ref. 2 for Shelf Mounting	C–8121–6

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY (Continued)

For Details see Plates E-5045 and E-5046

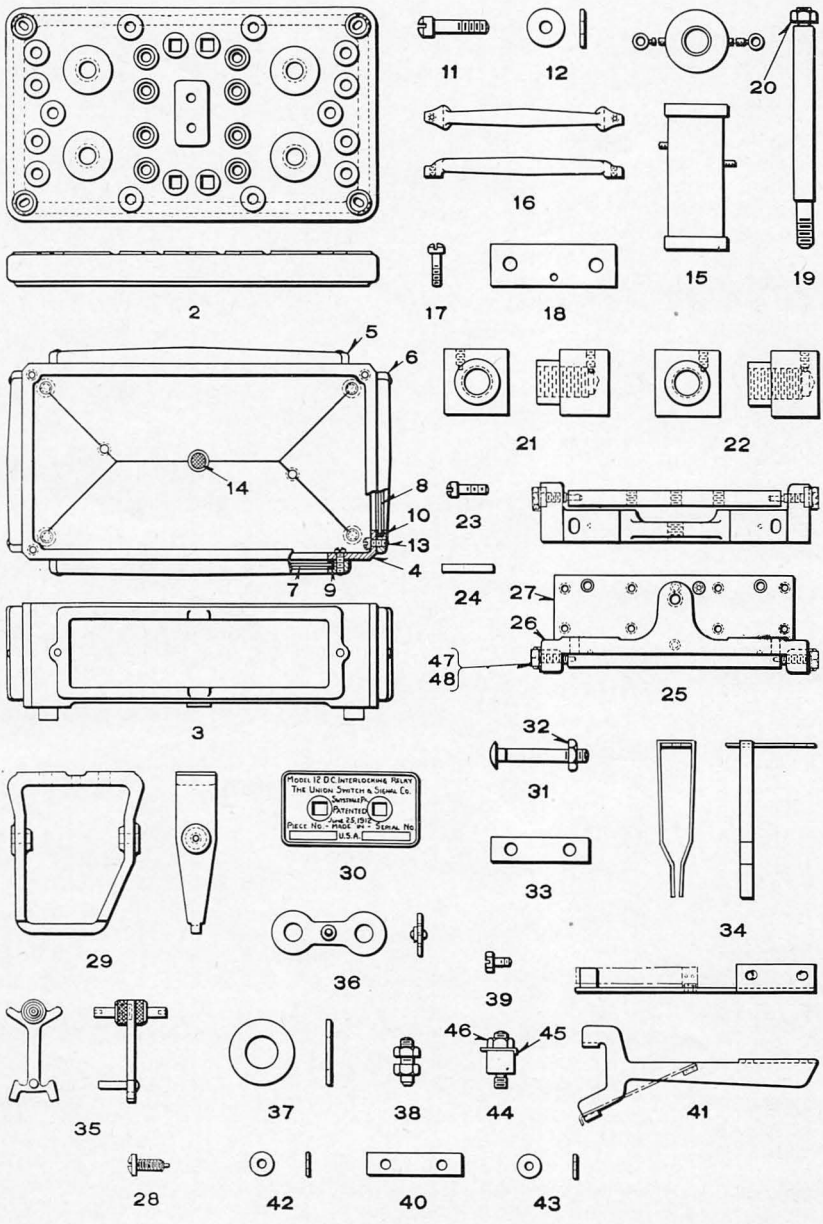
For Style "DX-13" Interlocking Relay refer to Plate E-5100

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	B-1	**Direct Current Enclosed Model 12 Interlocking Relay,** four front and two back contacts for each pair of magnets (one of the front contacts on each side for Automatic Flagman, see Refs. G and H, Plate E-5046) with Shock Absorber Springs Ref. 3 for Wall Mounting	C–8121–6
	C	**Direct Current Enclosed Model 12 Interlocking Relay,** four front and two back contacts for each pair of magnets (two of the front contacts on each side for Automatic Flagman, see Refs. G and H, Plate E-5046) with Shock Absorber Springs Ref. 2 for Shelf Mounting	C–8121–10
	C-1	**Direct Current Enclosed Model 12 Interlocking Relay,** four front and two back contacts for each pair of magnets (two of the front contacts on each side for Automatic Flagman, see Refs. G and H, Plate E-5046) with Shock Absorber Springs Ref. 3 for Wall Mounting	C–8121–10
176197	**2**	**Shock Absorber Spring Base** for Shelf Type Mounting	12404–27
176162	**3**	**Shock Absorber Spring Base** for Wall Type Mounting	12404–28

PLATE E-5045

UNION SWITCH & SIGNAL CO.



MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY
DETAIL PARTS

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5046

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
92103	**2**	**Porcelain Top Plate** for Relays as listed on Plate E-5040	C–8122–6
117215	**3**	**Case** complete with Ventilator, Doors and Shields for Relays listed on Plate E-5040	C–8121–5
92120	**4**	**Case,** complete with Ventilator and Studs	C–8122–5
92118	**5**	**Door** for Case Ref. 3	C–8122–5
92119	**6**	**Door** for Case Ref. 3	C–8122–5
92099	**7**	**Glass Shield, 2⅜″x8$\frac{5}{16}$″**	8163–255
92098	**8**	**Glass Shield, 2⅜″x4½″**	8163–255
92089	**9**	**Gasket** for Ref. 7	8078–1268
92088	**10**	**Gasket** for Ref. 8	8078–1268
	11	**Machine Screw No. 10-30x1″** Fil. Hd. S. (Cad. Pl.) for securing Ref. 2 to Ref. 3.	
26381	**12**	**Washer** for Ref. 11	7826–78
	13	**Machine Screw No. 10-30x½″** Fil. Hd. Steel, cadmium plated, for fastening Refs. 5 and 6 to Ref. 4.	
34340	**14**	**Ventilator** for Refs. 3 and 4	C–7459–6
	15	**Magnet Coil** complete, with Leads and Terminals (When ordering refer to Refs. 2 to 2q of Plate E-5025)	8133–
92114	**16**	**Handle**	8311–69
	17	**Machine Screw No. 8-36x½″** Fil. Hd. Steel, Cadmium Plated for securing Ref. 16 to Ref. 18.	

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5046

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
92104	**18**	**Backstrap**	8162–210
51617	**19**	**Magnet Core** with Hex. Nut Ref. 20	8101–206
51610	**20**	**Hex. Nut** for Ref. 19	8265–161
51618	**21**	**L. H. Pole Piece**	8250–44
51619	**22**	**R. H. Pole Piece**	8250–44
	23	**Machine Screw No. 8-36x½″** Fil. Hd. Brass for Refs. 21 and 22.	
49067	**24**	**Dowel Pin** for securing Refs. 19, 21 and 22	8097–336
110094	**25**	**Armature Bracket with Armature** and Pivot Screws, complete	C–7459–8
121355	**25a**	**Armature Bracket with Armature,** Pivot Screws, and Release Spring to be used on Relays without front contacts only	C–7459–8
50225	**26**	**Armature Bracket only**	8303–68
98417	**26a**	**Armature Bracket,** complete with Two Pivot Screws Ref. 28 and One Screw Ref. 38	8303–68
92106	**27**	**Armature,** complete for Ref. 25	8157–300
121346	**27a**	**Armature,** complete with Release Spring for Ref. 25a	8157–300
67265	**27b**	**Release Spring,** for Ref. 27a	8735–504
54920	**27c**	**Rivet** (For attaching Ref. 27b to Ref. 27a)	10301–1
47579	**28**	**Pivot Screw** for Ref. 29	8378–197
125695	**29**	**Pawl Support**	C–8122–6

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5046

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
92111	**30**	**Name Plate**	8225–216
	31	**Bolt with Nut** Ref. 32 for fastening Ref. 30 to Top Plate	12471–
79117	**31a**	**Bolt** for Ref. 31	8098–827
44230	**32**	**Nut** for Ref. 31	8109–281
45338	**33**	**Lock Washer** for Ref. 31	8486–155
92108	**34**	**Pawl Spring,** complete	8735–545
113086	**35**	**Pawl,** complete	9121–96
97123	**36**	**Core Plate,** complete	C–7459–10
51611	**37**	**Washer** used under coil	7828–218
	38	**Core Pin Screw,** complete, with Nut for Ref. 25	12471–
49141	**38a**	**Core Pin Screw only** for Ref. 38	8098–887
26942	**38b**	**Nut only** for Ref. 38	8109–184
62977	**39**	**Screw** for securing Ref. 27 to Ref. 41	8098–845
65405	**40**	**Lock Washer** for Ref. 39	8486–155
63269	**41**	**Locking Arm**	C–8122–2
141159	**41a**	**Locking Arm** complete with Spring	C–8122–2
65846	**42**	**Washer** (.010″ Thick) used between Refs. 27 and 41.	7828–287
65847	**43**	**Washer** (.0159″ Thick) used between Refs. 27 and 41.	7828–287
94819	**44**	**Insulating Bushing,** with Nut and Lock Washer, complete	12471–6

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

For complete Relays refer to Plate E-5040

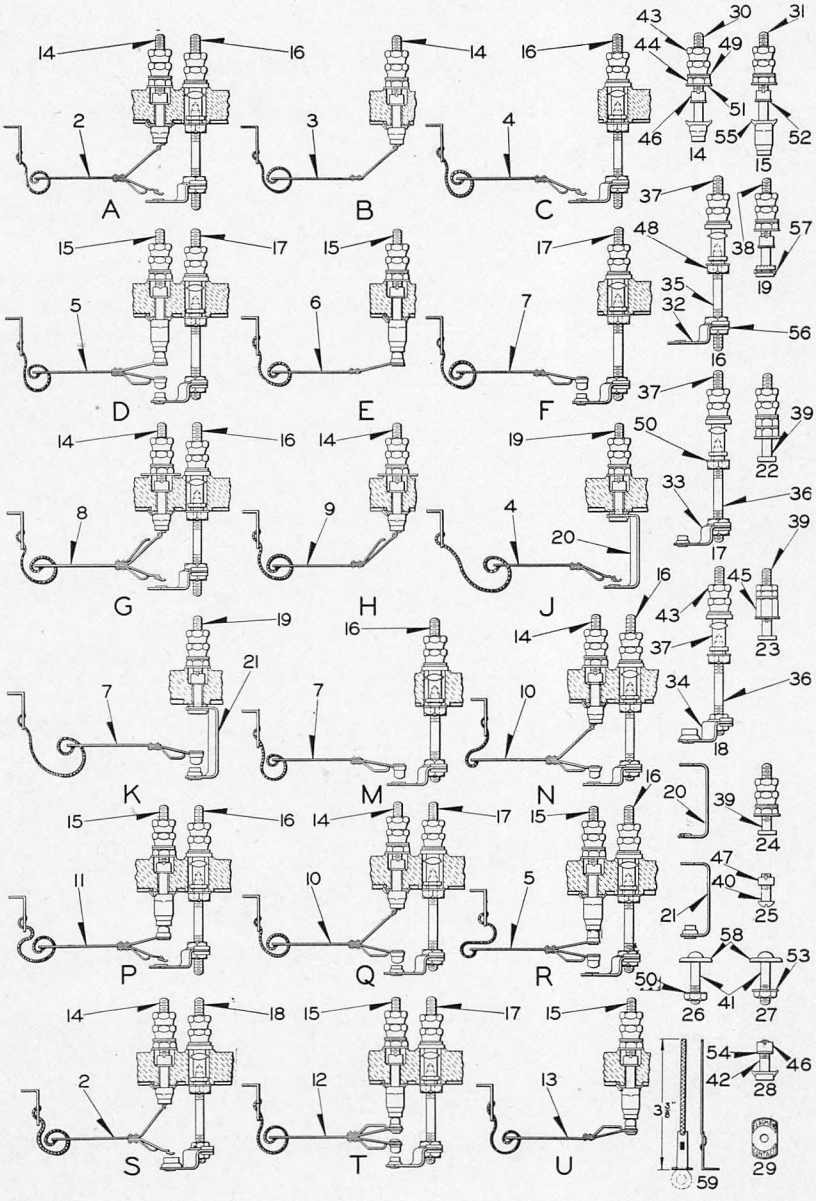
For other details refer to Plate E-5046

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
22621	**44a**	**Insulating Bushing only** for Ref. 44	8095–199
1515	**45**	**Nut** for Ref. 44	8109–23
19409	**46**	**Lock Washer** for Ref. 44	8486–68
159814	**47**	**Screw**	8378–354
159815	**48**	**Lock Washer**	8486–395

PLATE E-5046

UNION SWITCH & SIGNAL CO.



MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY
DETAIL PARTS

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5045

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Contact Assembly, complete with Contact Spring, Terminal Posts, Nuts, Washers and Lock Washers, Dwg. C-8121, sh. 7

Piece	Ref.	Contact Spring		Front Post	Back Post	Remarks	Assembly Includes
		Front	Back				
	A	Silver	Silver	Graphite	Silver	Front and Back L. V.	1-2, 1-14 and 1-16
	B	Silver		Graphite		Front only L. V.	1-3 and 1-14
	C		Silver		Silver	Back only L. V.	1-4 and 1-16
	D	Graphite	Graphite	Graphite	Graphite	Front and Back H. V.	1-5, 1-15 and 1-17
	E	Graphite		Graphite		Front only H. V.	1-6 and 1-15
	F		Graphite		Graphite	Back only H. V.	1-7 and 1-17
	G	Silver	Silver	Graphite	Silver	Front and Back L. V. for Auto Flagman	1-8, 1-14 and 1-16
	H	Silver		Graphite		Front only L. V. for Auto Flagman	1-9 and 1-14
	J		Silver		Silver	Back only L. V. (Intermediate)	1-4, 1-19 and 1-20
	K		Graphite		Graphite	Back only H. V. (Intermediate)	1-7, 1-19 and 1-21
	M		Graphite		Silver	Back only L. V.	1-7 and 1-16
	N	Silver	Graphite	Graphite	Silver	Front and Back L. V.	1-10, 1-14 and 1-16
	P	Graphite	Silver	Graphite	Silver	Front and Back; H. V. Front and L. V. Back	1-11, 1-15 and 1-16

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5045

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Contact Assembly, complete with Contact Spring, Terminal Posts, Nuts, Washers and Lock Washers, Dwg. C-8121, sh. 7

Piece	Ref.	Contact Spring		Front Post	Back Post	Remarks	Assembly Includes
		Front	Back				
	Q	Silver	Graphite	Graphite	Graphite	Front and Back; L. V. Front and H. V. Back	1-10, 1-14 and 1-17
	R	Graphite	Graphite	Graphite	Silver	Front and Back; H. V. Front and L. V. Back	1-5, 1-15 and 1-16
	S	Silver	Silver	Graphite	Graphite	Front and Back L. V.	1-2, 1-14 and 1-18
	T	Graphite	Graphite	Graphite	Graphite	Front and Back H. V. for Auto Flagman	1-12, 1-15 and 1-17
	U	Graphite		Graphite		Front only H. V. for Auto Flagman	1-13 and 1-15

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5045

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
141145	**2**	**Front and Back L. V. Contact Spring** with Connector	8385–2061
94986	**3**	**Front L. V. Contact Spring** with Connector	8385–1549
141147	**4**	**Back L. V. Contact Spring** with Connector	8385–2061
77880	**5**	**Front and Back H. V. Contact Spring** with Connector	8385–1573
77879	**6**	**Front H. V. Contact Spring** with Connector	8385–1573
79365	**7**	**Back H. V. Contact Spring** with Connector	8385–1573
141153	**8**	**Front and Back L. V. Contact Spring** with Connector (For Automatic Flagman)	8385–2063
79385	**9**	**Front L. V. Contact Spring** with Connector (For Automatic Flagman)	8385–1661
94987	**10**	**Front and Back** (L. V. Front and H. V. Back) Contact Spring with Connector	8385–1723
151151	**11**	**Front and Back** (H. V. Front and L. V. Back) Contact Spring with Connector	8385–2062
151564	**12**	**Front and Back H. V. Contact Spring** with Connector for Automatic Flagman	8385–2161
151566	**13**	**Front H. V. Contact Spring** with Connector for Automatic Flagman	8385–2161
127790	**14**	**Front Terminal Post** (Graphite Tip) complete with Nuts, Washers and Lock Washers (Includes 1-30, 2-43, 1-44, 1-46, 2-49, 1-51, 1-52 and 1-55)	12451–188
	15	**Front Terminal Post** (Graphite Tip) complete with Nuts, Washers and Lock Washers (Includes 1-31, 2-43, 1-44, 1-46, 2-49, 1-51, 1-52 and 1-55)	12451–

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5045

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Rrawing Reference
155462	**16**	**Back Terminal Post L. V.** (Silver Tip) complete with Nuts, Washers and Lock Washers (Includes 1-32, 1-35, 1-37, 2-43, 2-44, 1-48, 2-49, 1-50 and 1-56).....	12451–189
	17	**Back Terminal Post H. V.** (Graphite Tip) complete with Nuts, Washers and Lock Washers (Includes 1-33, 1-36, 1-37, 2-43, 2-44, 1-48, 2-49, 1-50 and 1-56)	12451–
	18	**Back Terminal Post H. V.** (Graphite Tip) complete with Nuts, Washers and Lock Washers (Includes 1-34, 1-36, 1-37, 2-43, 2-44, 1-48, 2-49, 1-50 and 1-56)	12451–
128348	**19**	**Back Terminal Post,** complete with Nuts, Washers and Lock Washers (Includes 1-38, 2-43, 1-44, 1-46, 2-49, 1-50, 1-52, 1-55 and 1-57).....	12451–192
141077	**20**	**Back Intermediate Contact L. V.**.....	8094–2176
122073	**21**	**Back Intermediate Contact H. V.**.....	8094–1205
	22	**Terminal Post,** for Magnet Leads complete with Nuts and Washers (Includes 1-39, 2-43, 2-44, 3-49 and 1-50).....	12451–
155253	**23**	**Terminal Post,** complete with Nuts and Washers (Includes 1-39, 2-44, 1-45, 1-49 and 1-50).....	12451–121
78078	**24**	**Terminal Post,** complete with Nuts and Washers (Includes 1-39, 2-43, 1-44, 2-49 and 1-50).....	12451–44
	25	**Dummy Post** with Nut Ref. 47 for front contact post hole of relay.....	12471–3
94436	**26**	**Dummy Post** as shown for outside back post hole of relay.....	12471–3
	27	**Dummy Post** as shown for back of relay.....	12471–

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

For complete Relays refer to Plate E-5040

For other details refer to Plate E-5045

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	28	**Screw** as shown for use with release spring when no front contacts are used on relay	12471–
92115	29	**Washer,** for Flagman Contact Post	7828–337
92117	30	**Front Terminal Post only** with Graphite Tip	8094–1185
92295	31	**Front Terminal Post only** with Graphite Tip	8094–1185
98905	32	**Back Terminal Post only** with Silver Tip	8094–2034
76160	33	**Back Terminal Post only** with Graphite Tip	8094–2034
114323	34	**Back Terminal Post only** with Graphite Tip	8094–1257
46277	35	**Terminal Post** for L. V. Back Contact	8094–874
31064	36	**Terminal Post** for H. V. Back Contact	8094–654
30813	37	**Terminal Post** for Refs. 16, 17 and 18	8094–639
31668	38	**Terminal Post** for Ref. 19	8094–706
29145	39	**Terminal Post** for Refs. 22, 23 and 24	8094–706
	40	**Machine Screw No. 14-24x¾″** Rd. Hd. S. (Cad. Pl.) for Ref. 25.	
31067	41	**Screw only** for Refs. 26 and 27	8098–558
121215	42	**Screw only** for Ref. 28	8098–1397
29101	43	**Hex. Nut**	8109–193
29103	44	**Hex. Nut**	8109–194
56635	45	**Hex. Nut**	8109–324
69706	46	**Square Nut**	8109–383

UNION SWITCH & SIGNAL CO.

MODEL 12 DIRECT CURRENT ENCLOSED INTERLOCKING RELAY DETAIL PARTS (Continued)

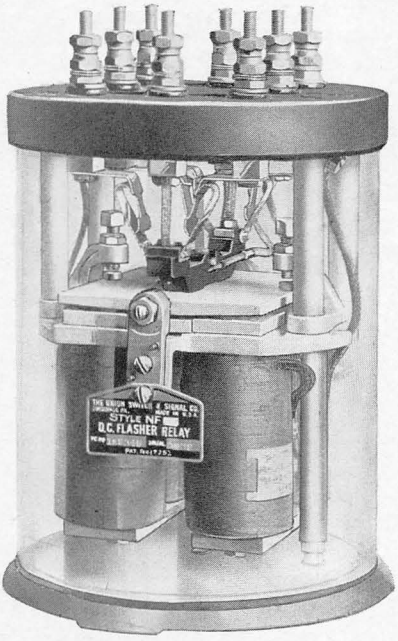
For complete Relays refer to Plate E-5040

For other details refer to Plate E-5045

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
72948	**47**	**Square Nut**	8109–383
31670	**48**	**Hex. Nut**	8109–218
29102	**49**	**Washer**	7828–139
29104	**50**	**Washer**	7828–138
69705	**51**	**Washer**	7828–287
70539	**52**	**Washer**	8274–73
2615	**53**	**Washer**	7828–10
38448	**54**	**Washer**	7826–98
29063	**55**	**Lock Washer**	8486–111
32186	**56**	**Lock Washer**	8486–129
55794	**57**	**Lock Washer**	8486–267
36088	**58**	**Washer** for Refs. 26 and 27	7828–138
97875	**59**	**Flexible Connector** with Terminal for Contact Springs	10934–162

UNION SWITCH & SIGNAL CO.



The Style "NF" Relay has an overall diameter of 7 inches and height of 10-1/8 inches.

STYLE "NF" D. C. FLASHER RELAY

This relay provides flashes of light of proper timing and duration for Highway Crossing Signals. While based on the standards set by the Signal Section, A. R. A., it has been developed for the specific work it has to perform.

The Style "NF" (Neutral Flasher) Relay provides 28, 30 to 35 or 40 to 45 flashes of light per minute from each lamp unit. The flashes are of the same duration, this being made possible by symmetrical arrangement of parts—an exclusive feature of this relay. Lamp operating and relay control circuits are clearly indicated by terminal identifications moulded in the top plate. Connections within the relay are simply made and can be readily traced, due to the 100 percent view provided by the cylindrical glass shield.

Contact equipment is of sufficient capacity for controlling one to three of our flashing light type highway crossing signals receiving energy from a single battery, or duplicate batteries wired as recommended by the Signal Section, A. R. A.

Constant timing and duration of flashes of light are maintained throughout a wide voltage range. But two resistances, 350 and 800 ohms, are necessary to take care of a range of 5.5 to 12 volts, as listed below:

350-ohms		800-ohms	
Normal	Minimum	Normal	Minimum
6-8 volts	5.5 volts	10-12 volts	8 volts

UNION SWITCH & SIGNAL CO.

STYLE "NF" D. C. FLASHER RELAY

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
125344	**A**	**Style "NF" D.C. Flasher Relay** complete, 350-ohms resistance per pair of coils, 30-35 Flashes per minute	C–9027–2
125345	**Aa**	**Style "NF" D.C. Flasher Relay** complete, 800-ohms resistance per pair of coils, 30-35 Flashes per minute.	C–9027–2
128680	**Ab**	**Style "NF" Flasher Relay** complete, 350-ohms resistance per pair of coils, 28 Flashes per minute.....	C–9027–2
128681	**Ac**	**Style "NF" D.C. Flasher Relay** complete, 800-ohms resistance per pair of coils, 28 Flashes per minute....	C–9027–2
153199	**Ad**	**Style "NF" D.C. Flasher Relay** complete, 350-ohms resistance per pair of coils, 28 Flashes per minute (with Rectifier for radio interference elimination per View "X" Plate E-5061).....	C–9027–2
165977	**Ae**	**Style "NF" D.C. Flasher Relay** complete, 800-ohms resistance per pair of coils, 30-35 Flashes per minute (with Rectifier for radio interference elimination per View "X" Plate E-5061).....	C–9027–2
171921	**Af**	**Style "NF" D.C. Flasher Relay** complete, 800-ohms resistance per pair of coils for L. H. Magnet; R. H. rear Coil having 400-ohms resistance and R. H. front Magnet consisting of 47 Copper Washers per View "Z" Plate E-5061 for Train Order Signal 40-45 Flashes per minute.....	C–9027–2
156074	**Ag**	**Style "NF" D.C. Flasher Relay** complete, special calibration and with slow acting coils on L. H. side and quick acting coils on R. H. side per View "Y" Plate E-5061, 300-ohms resistance per pair of coils on L. H. side and 350-ohms resistance per pair of coils on R. H. side, 52-58 Flashes per minute.....	C–9027–2

Style FN-16A Flasher Relay

The Style FN-16A improved flasher relay offers the many proved advantages of the former Style FN-16 flasher relay, which include safety, reliability, simplicity of design, and excellent timing characteristics, and in addition provides improved contact life, particularly when the relay is employed to control d.c. lamp circuits. This relay is especially applicable for the control of flashing light highway crossing signals and can be used for either shunt control or make and break control of the lamps. It is also suitable for the operation of flashing signals employed in various railway signaling applications to obtain additional signal indications. The relay is available with either 2N-2R or 4N-4R lamp contacts, rated at 5 amperes per contact.

In physical size and in most of its details, the FN-16A relay is the same as the well-known Style FN-16 relay. It differs from the Style FN-16 relay only in the design of the lamp contacts, which necessitates the use of a heavier armature counterweight, and in that the armature supporting bracket is arranged to permit the armature to be assembled in the relay with contact springs in place, thus facilitating relay repair.

The operating mechanism is designed to provide minimum wear at the armature pivots and core pins, thus assuring that the rate of contact operation (i.e., flashing rate) remains above the A.A.R. minimum value without any need of adjustment for many millions of operations. Original timing can readily be restored in the field, when required, by removing one or more copper washers from the common core. The core and coil assembly is so constructed that timing adjustments can be made and coils can be changed without unsealing the relay or disturbing relay adjustments.

Oscillation of the armature is so regulated that flashes of equal duration and uniform time intervals between flashes are provided. Moreover, the timing is reasonably independent of variations in impressed voltage because of the method of alternately shunting the relay windings, which tends to retard the changes of flux in the magnetic circuit.

Another distinctive feature of the relay is that the armature is biased by a counterweight so that one-half of the lamp contacts are normally closed when the relay is deenergized. Thus, in highway crossing signal installations, if the track relay becomes deenergized and proper energy is not received at the Style FN-16A relay to operate it, one steady red indication will be displayed by each signal.

File Plates in proper sequence in Looseleaf Covers.
Plate E-5051 dated 1-49 supersedes issue of 7-39.

B

Height 8⅝", Width 7⅝", Depth 6½".

Style "FN-16A" Flasher Relay

See preceding page for description.

Style "FN-16A" 4N-4R and 2N-2R D. C. Flasher Relays

For details refer to Plate E-5065. Shelf Type Shock Absorbers (Ref. 76, Plate E-5065) or Wall Type Shock Absorbers (Ref. 77, Plate E-5065) are furnished with each Relay. Orders should specify type desired.
All relays listed below are equipped with a small rectifier for suppression of radio interference originating in the operating contacts. Suppression of radio interference originating in lamp contacts may be obtained by including References 70 or 71 of Plate E-5065 in the order.

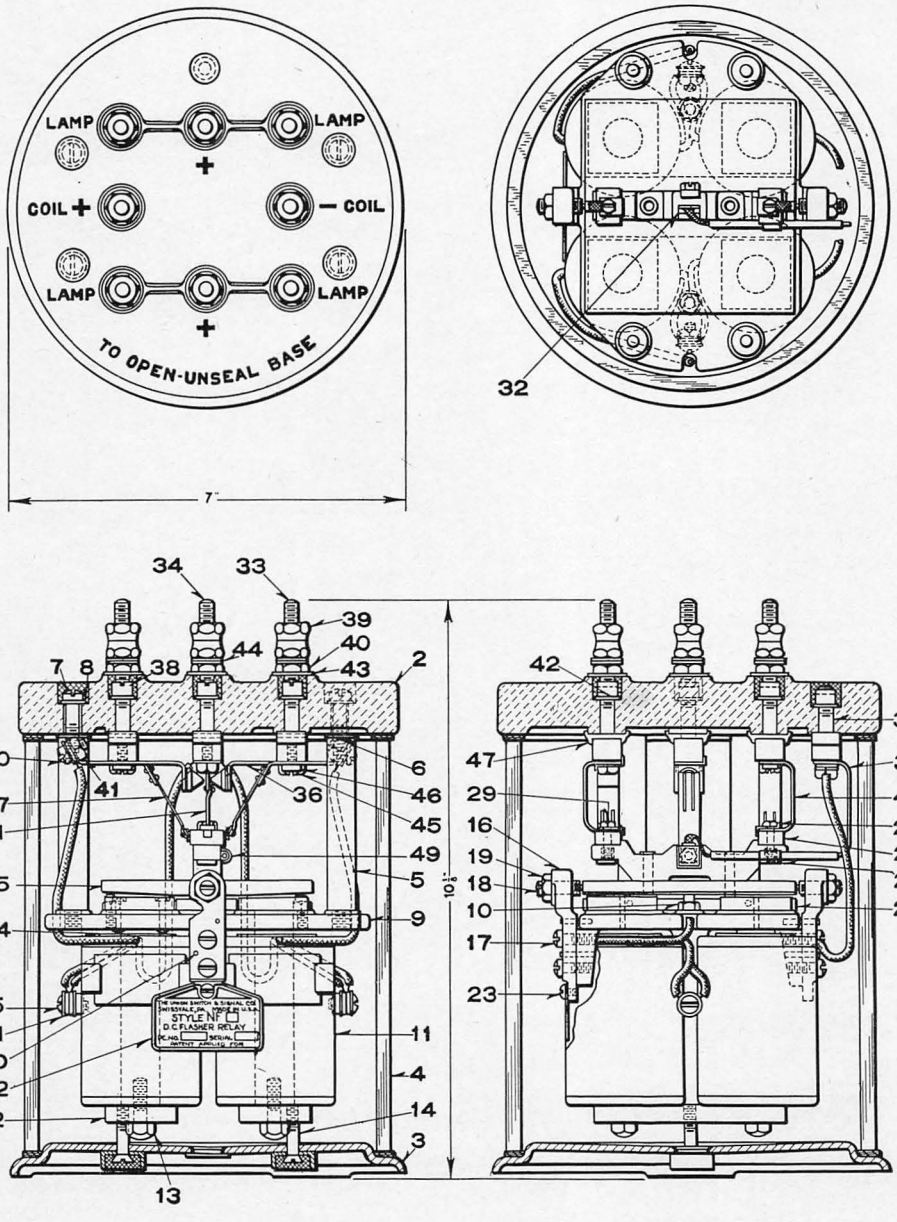
Material necessary to change the Style "FN-16" Relay to have the same contacts as Style "FN-16A" Relay may be obtained by ordering reference 83 or 83a of Plate E-5065. Detail parts of Style "FN-16" Relays are shown on Plate E-5064.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
265738	**B**	**Style "FN-16A" 4N-4R D.C. Flasher Relay Complete.** 500-ohms resistance per each coil, 40 to 45 Flashes per minute, for 10 or 12 Volts D.C.....	C–9357–9
265739	**Ba**	**Style "FN-16A" 4N-4R D.C. Flasher Relay Complete.** 200-ohms resistance per each coil, 40 to 45 Flashes per minute, for 8 Volts D.C.....	C–9357–9
265740	**Bb**	**Style "FN-16A" 4N-4R D.C. Flasher Relay Complete.** 4.5-ohms resistance per each coil, 40 to 45 Flashes per minute, for 1.2 Volts D.C.....	C–9357–9
265889	**Bc**	**Style "FN-16A" 2N-2R D.C. Flasher Relay Complete.** 500-ohms resistance per each coil, 40 to 45 Flashes per minute, for 10 or 12 Volts D.C.....	C–9357–11
265890	**Bd**	**Style "FN-16A" 2N-2R D.C. Flasher Relay Complete.** 200-ohms resistance per each coil, 40 to 45 Flashes per minute, for 8 Volts D.C.....	C–9357–11
265891	**Be**	**Style "FN-16A" 2N-2R D.C. Flasher Relay Complete.** 4.5-ohms resistance per each coil, 40 to 45 Flashes per minute, for 1.2 Volts D.C.....	C–9357–11

PLATE E-5060

UNION SWITCH & SIGNAL CO.



DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY

This plate is shown in order that correct references of repair parts may be ordered by those having Relays without armature backstops. Repair parts for Relays having armature backstops are shown on Plate E-5061.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
125353	**2**	**Top Plate,** complete with terminal posts and contact springs	C–9027–1
125148	**2a**	**Top Plate,** complete with gasket for Ref. 2	C–9028–1
33872	**2b**	**Gasket only** for Refs. 2 and 3	8078–76
	3	**Base,** complete with gasket, ventilator and collar ($\frac{21}{64}$″ holes having 3″ centers)	10937–3
125249	**4**	**Glass Shield**	8163–96
125625	**5**	**Stud** for securing Ref. 9 to Ref. 2 (Rev. 2)	8115–157
29104	**6**	**Washer** for Ref. 5	7828–134
	7	**Machine Screw, No. 14-24x1″** Fil. Hd. S. (cadmium plated) for Ref. 2.	
38448	**8**	**Washer** for Ref. 7	7826–98
125243	**9**	**Core,** complete	C–9028–1
127791	**10**	**Screw**	8190–354
1509	**10a**	**Nut** for Ref. 10	8109–15
135256	**11**	**Magnet Coil** complete, 175-ohms	8133–336
135257	**11a**	**Magnet Coil** complete, 400-ohms	8133–336
	12	**Backstrap** with No. 10-30 tapped hole	8162–214
	13	**Cap Screw,** S. A. E. Std. $\frac{1}{4}$″-28x$\frac{3}{4}$″ Hex. Hd. (Cadmium plated) for Ref. 12.	
	14	**Machine Screw No. 10-30x1″** Flat Hd. S. (Cadmium plated) for Ref. 3.	

PLATE E-5060

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	15	**Machine Screw No. 10-30x3/8″** Rd. Hd. brass (nickel plated) complete with one washer Ref. 51 and one nut Ref. 41 for leads.	
	15a	**Machine Screw only, No. 10-30x3/8″** Rd. Hd. brass (Nickel plated) for Ref. 15.	
125245	**16**	**Armature Bracket**	8303–80
	17	**Machine Screw No. 10-30x1/2″** Fil. Hd. brass (nickel plated) for Ref. 16.	
125631	**18**	**Pivot Screw**	8378–266
535	**19**	**Hex. Nut** for Ref. 18	8109–1
57497	**20**	**Dowel Pin**	8097–872
125606	**21**	**Armature,** complete	8157–311
125161	**22**	**Name Plate**	8225–245
	23	**Machine Screw, No. 6-40x1/4″** Rd. Hd. brass (nickel plated) for Ref. 22.	
125610	**24**	**Insulating Washer**	8078–574
125248	**25**	**Armature, complete**	8157–310
164202	**25a**	**Armature,** complete with Terminal Block, Contact Tip and Middle Contact	C–9027–1
125608	**26**	**Nut**	8109–410
125343	**27**	**Contact Tip**	8341–109
125615	**28**	**Lock Washer** for Ref. 29	8486–365
125624	**29**	**Screw**	8098–404

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
125614	**30**	**Connector,** complete	8064–562
125601	**31**	**Contact Spring,** complete	8385–1943
125607	**32**	**Nut**	8109–418
150486	**33**	**Terminal Post,** complete with Nuts, Washers and Lock Washers (Inc. 1-33a, 1-38, 2-39, 1-40, 1-42, 1-43, 2-44, 1-45, 1-46 and 1-47)	12451–250
125352	**33a**	**Terminal Post only,** for Ref. 33	8094–2094
150487	**34**	**Terminal Post,** complete with Nuts, Washers and Lock Washers (Inc. 1-34a, 1-38, 2-39, 1-40, 1-42, 1-43, 2-44, 1-45, 1-46 and 1-47)	12451–251
125351	**34a**	**Terminal Post only,** for Ref. 34	8094–2094
	35	**Terminal Post,** complete with Nut, Washers, and Lock Washer	12451–
156755	**35a**	**Terminal Post only,** for Ref. 35	8094–2094
	36	**Terminal Post** (See Ref. 36, Plate E-5061 for latest design)	8094–2231
156133	**37**	**Contact Spring,** complete	8385–2186
69706	**38**	**Nut**	8109–383
29101	**39**	**Hex. Nut**	8109–193
29103	**40**	**Hex. Nut**	8109–194
26545	**41**	**Hex. Nut**	8109–181
70539	**42**	**Washer** (lead)	8274–73
69705	**43**	**Washer**	7828–287

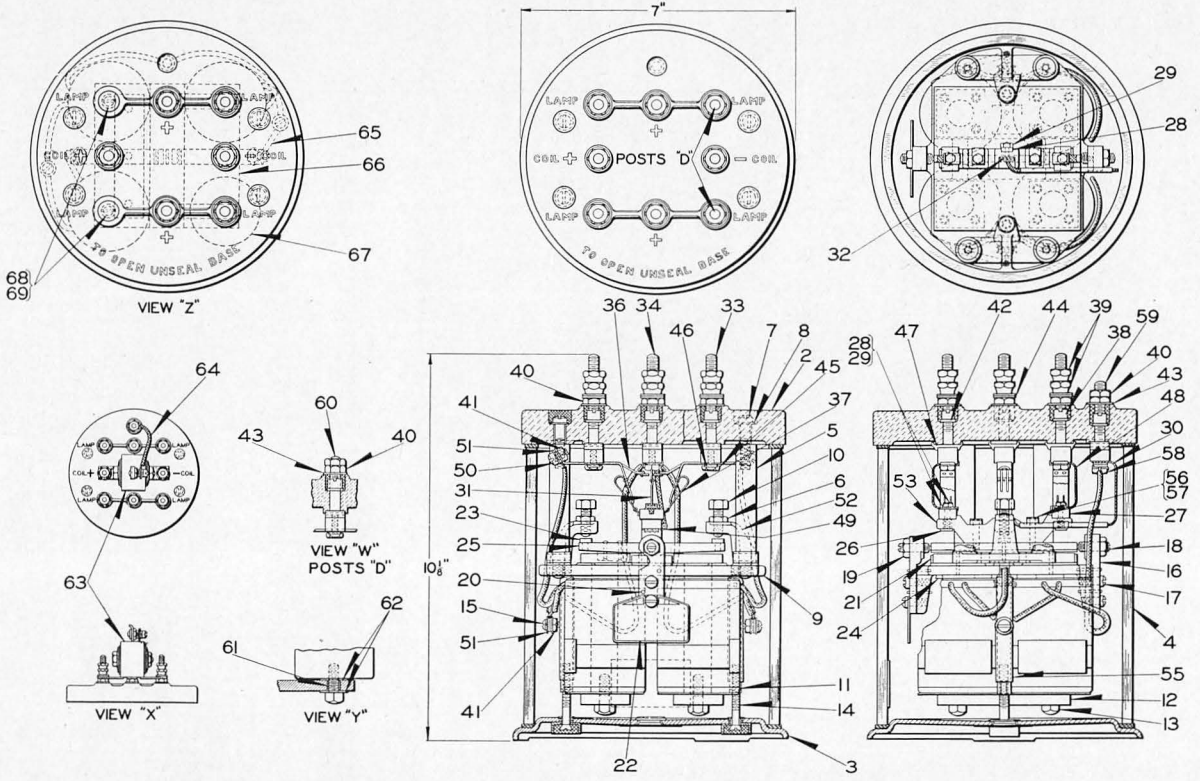
PLATE E-5060

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
29102	**44**	**Washer**	7828–139
129546	**45**	**Screw**	8098–403
125616	**46**	**Lock Washer**	8486–102
29063	**47**	**Lock Washer**	8486–111
125611	**48**	**Connector**	10934–107
125622	**49**	**Clip**	11893–217
	50	**Machine Screw, No. 10-30x3/8″** Fil. Hd. brass (nickel plated) complete with one Washer Ref. 51 and Hex. Nut Ref. 41.	
	50a	**Machine Screw, No. 10-30x3/8″** Fil. Hd. brass (Nickel plated) for Ref. 50.	
53	**51**	**Washer** for Refs. 15 and 50	7828–5



STYLE "NF" DIRECT CURRENT FLASHER RELAY
DETAIL PARTS

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY EQUIPPED WITH ARMATURE BACKSTOP

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
125353	**2**	**Top Plate,** complete with terminal posts and contact springs	C–9027–1
125148	**2a**	**Top Plate,** complete with Gasket for Refs. 2 and 2c	C–9028–1
33872	**2b**	**Gasket only** for Refs. 2 and 3	8078–76
156072	**2c**	**Top Plate,** complete with terminal posts and contact springs (Posts "D" per View "W") (For Ref. Ag, Plate E-5050)	C–9027–1
125239	**3**	**Base,** complete with Gasket, Ventilator and Collar	10937–3
125249	**4**	**Glass Shield**	8163–96
125625	**5**	**Stud** for securing Ref. 9 to Ref. 2	8115–157
1509	**6**	**Hex. Nut** for Ref. 10	8109–15
	7	**Machine Screw No. 14-24x1″** Fil. Hd. S. (Cad. Pl.) for Ref. 2.	
38448	**8**	**Washer only** for Ref. 7	7826–98
125243	**9**	**Core,** complete	C–9028–1
164586	**10**	**Adjusting Screw,** complete with Nut Ref. 6	12471-31
131919	**10a**	**Adjusting Screw only** for Ref. 10	8190–359
135256	**11**	**Magnet Coil,** complete 175-ohms	8133–336
135257	**11a**	**Magnet Coil,** complete 400-ohms	8133–336
156106	**11b**	**Magnet Coil,** complete 150-ohms (Slow Acting)	8133–385
125244	**12**	**Backstrap**	8162–214
	13	**Cap Screw, S.A.E. ¼″-28x¾″** Hex. Hd. for Ref. 12.	

PLATE E-5061

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY EQUIPPED WITH ARMATURE BACKSTOP (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	14	**Machine Screw No. 10-30x1½″** Flat Hd. S. (Cad. Pl.) for Ref. 3.	
	15	**Machine Screw No. 10-30x$\frac{7}{16}$″** Rd. Hd. Br. (N. P.) complete with two washers Ref. 51, one Nut Ref. 41 and No. 10 Pl. S. Lock Washer ($\frac{1}{8}$″x$\frac{3}{64}$″) (Cad. Pl.).	
	15a	**Machine Screw only No. 10-30x$\frac{7}{16}$″** Rd. Hd. Br. (N. P.) for Ref. 15.	
125245	**16**	**Armature Bracket**	8303–87
	17	**Machine Screw No. 10-30x½″** Fil. Hd. Br. (N. P.) for Ref. 16.	
128282	**18**	**Pivot Screw,** complete with Nut Ref. 19	12471–20
535	**19**	**Hex. Nut** for Ref. 18	8109–1
57497	**20**	**Dowel Pin**	8097–872
125605	**21**	**Armature**	8157–311
125161	**22**	**Name Plate**	8225–245
138359	**23**	**Stud** used as backstop on armature Ref. 25	8114–651
135871	**24**	**Ins. Washer** (use as required)	8078–1042
125248	**25**	**Armature,** complete	8157–310
164202	**25a**	**Armature,** complete with terminal block, Contact Tip and Middle Contact	C–9027–1
125608	**26**	**Nut**	8109–419
125343	**27**	**Contact Tip**	8341–109
125615	**28**	**Lock Washer** for Ref. 29	8486–365

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY EQUIPPED WITH ARMATURE BACKSTOP (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
125624	**29**	**Screw**	8098–404
125614	**30**	**Connector,** complete	8064–562
125601	**31**	**Contact Spring,** complete	8385–1943
125607	**32**	**Nut**	8109–418
150486	**33**	**Terminal Post,** complete with Nuts, Washers and Lock Washers (Inc. 1-33a, 1-38, 2-39, 1-40, 1-42, 1-43, 2-44, 1-45, 1-46 and 1-47)	12451–250
125352	**33a**	**Terminal Post only** for Ref. 33	8094–2094
150487	**34**	**Terminal Post** complete with Nuts, Washers and Lock Washers (Inc. 1-34a, 1-38, 2-39, 1-40, 1-42, 1-43, 2-44, 1-45, 1-46 and 1-47)	12451–251
125351	**34a**	**Terminal Post only** for Ref. 34	8094–2094
	35	**Terminal Post** complete with Nuts, Washers and Lock Washers (Used previous to 2-28-29) Not shown	12451–
125627	**35a**	**Terminal Post only** for Ref. 35	8094–2094
156661	**36**	**Contact with Silver Tip**	8094–2231
156133	**37**	**Contact Spring,** complete	8385–2186
69706	**38**	**Nut**	8109–383
29101	**39**	**Hex. Nut**	8109–193
29103	**40**	**Hex. Nut**	8109–194
26545	**41**	**Hex. Nut**	8109–181
70539	**42**	**Washer** (Lead)	8274–73

PLATE E-5061

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY EQUIPPED WITH ARMATURE BACKSTOP (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
69705	**43**	**Washer**	7828–287
29102	**44**	**Washer**	7828–139
129546	**45**	**Screw**	8098–403
125616	**46**	**Lock Washer**	8486–102
29063	**47**	**Lock Washer**	8486–111
125611	**48**	**Connector**	10934–107
125622	**49**	**Clip**	11893–217
	50	**Machine Screw No. 10-30x3/8″** Fil. Hd. Br. (N. P.) complete with one Washer Ref. 51 and Hex. Nut Ref. 41.	
	50a	**Machine Screw No. 10-30x3/8″** Fil. Hd. Br. (N. P.) for Ref. 50.	
53	**51**	**Washer** for Refs. 15 and 50	7828–5
131880	**52**	**Armature Stop**	8303–92
125342	**53**	**Terminal Block**	9968–663
125339	**54**	**Eyelet** (Used previous to 6-17-25) (Not shown)	12579–2
156774	**55**	**Stud** complete	8114–715
162664	**56**	**Screw**	8098–924
153987	**57**	**Nut Lock**	8486–368
125623	**58**	**Screw**	8098–403

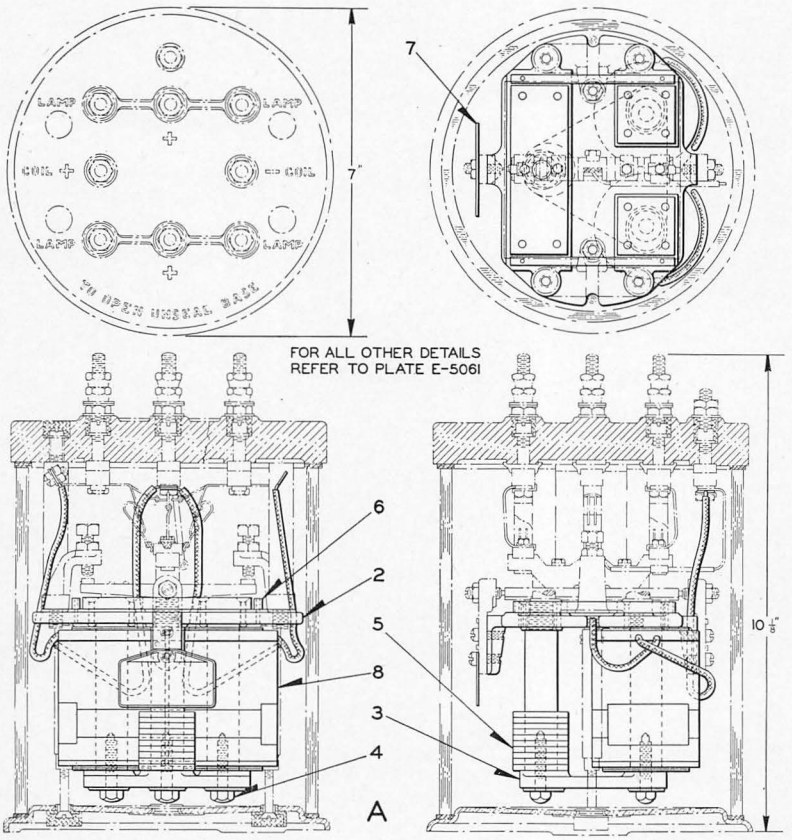
UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "NF" D. C. FLASHER RELAY EQUIPPED WITH ARMATURE BACKSTOP (Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
151661	**59**	**Terminal Post** complete with Nuts, Washers and Lock Washers (Inc. 1-59a, 1-38, 2-40, 1-42, 1-43, 1-46 and 1-47)	12451–252
156755	**59a**	**Terminal Post only** for Ref. 59	8094–2094
	60	**Terminal Post** complete with Nuts and Washers (Inc. 1-60a, 2-40, 1-43, 1-38 and 1-42) (For Top Plate Ref. 2c)	12451–
156142	**60a**	**Terminal Post only** for Ref. 60	8094–2228
156150	**61**	**Ferrule**	10389–29
156151	**62**	**Washer**	7828–176
153194	**63**	**Type R-19 Rectifier**	12558–11
60539	**64**	**Lead** complete	B–9990–5
174931	**65**	**Lead**	B–9990–24
174812	**66**	**Armature** complete for Ref. 66a	8157–395
	66a	**Armature** complete with Terminal Block, Contact Tip and Middle Contact for Relay Ref. Af, Plate E-5050	C–9027–3
174810	**67**	**Copper Washer**	7828–368
	68	**Machine Screw, No. 14-24x¾″** Fil. Hd. S. (Cad. Pl.) (used as dummy post).	
72948	**69**	**Nut,** for Ref. 68	8109–383

UNION SWITCH & SIGNAL CO.



STYLE "NF-2" D. C. FLASHER RELAY

The Style "NF-2" Flasher Relay is very similar to the Style "NF" Relay shown on calatog Plate E-5061. The design has been simplified by the elimination of two magnet coils and the excellent wearing and timing qualities of the "NF" Relay have been retained.

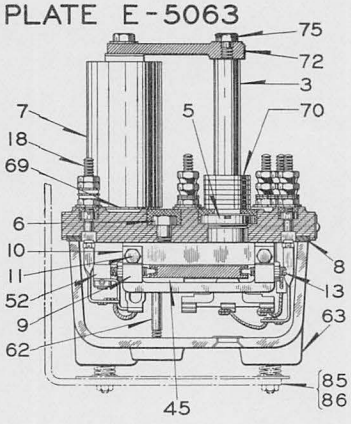
UNION SWITCH & SIGNAL CO.

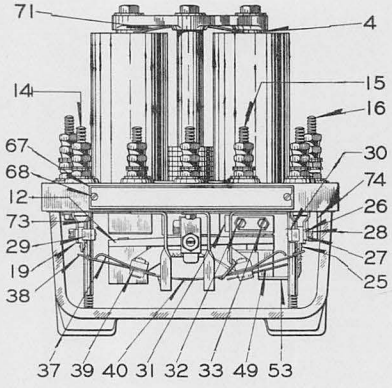
STYLE "NF-2" D. C. FLASHER RELAYS AND DETAILS

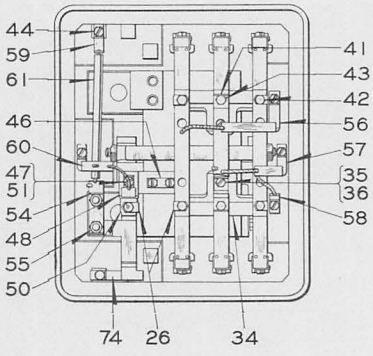
Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

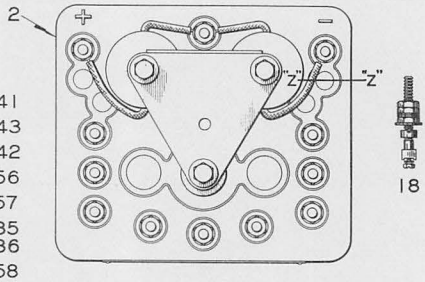
Piece	Ref.	Description	Drawing Reference
183669	**A**	**Style "NF-2" D. C. Flasher Relay Complete,** 175-ohms per coil, 30-40 flashes per minute, for 6-8 Volt operation	C-9027-5
183642	**Aa**	**Style "NF-2" D. C. Flasher Relay Complete,** 400-ohms per coil, 30-40 flashes per minute, for 10-12 Volt operation	C-9027-5
184222	**Ab**	**Style "NF-2" D. C. Flasher Relay Complete,** 175-ohms per coil, 30-40 flashes per minute, for 6-8 Volt operation, with Rectifier for radio interference elimination per View "X" of Plate E-5061	C-9027-5
183609	**2**	**Core Complete** with Bracket, Cores and Pole Pieces	C-9028-2
183613	**3**	**Back Strap**	8162-251
	4	**Cap Screw, S. A. E. ¼"-28 x ⅞"** Hex. Hd.	
161195	**5**	**Copper Washer**	7828-176
183606	**6**	**Shunt Bar**	8157-411
183822	**7**	**Name Plate**	8225-449
183668	**8**	**Magnet Coil Complete,** 175-ohms	8133-336
157409	**8a**	**Magnet Coil Complete,** 400-ohms	8133-336
		For all other details refer to Plate E-5061.	

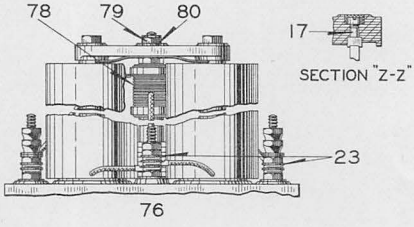
PLATE E-5063

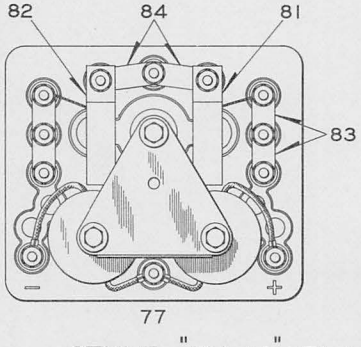


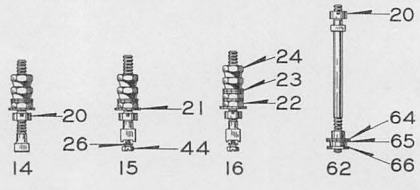












STYLE "FN-16" FLASHER RELAY (3N-3R)

6-16-39

UNION SWITCH & SIGNAL CO.

DETAILS OF THE STYLE "FN-16" D.C. FLASHER RELAY
(3N-3R)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

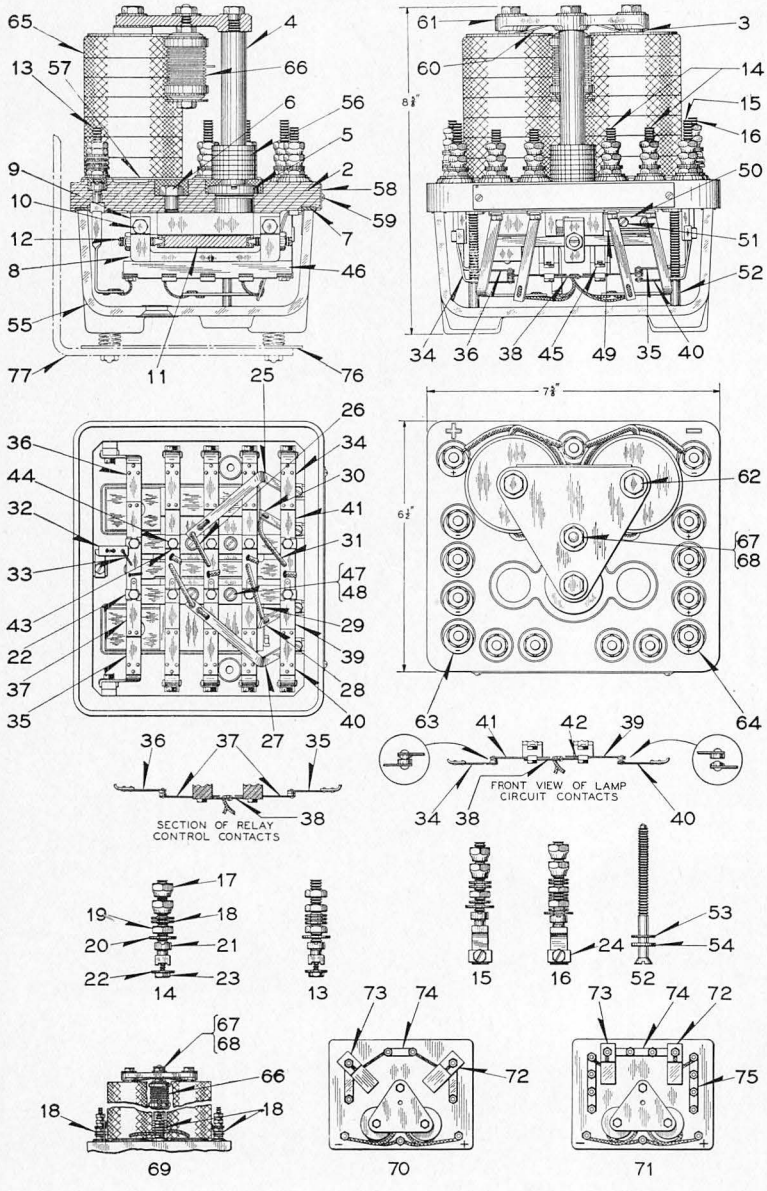
PIECE	REF.	DESCRIPTION	DWG. REF.
170797	2	TOP PLATE ONLY (Without Cores)	C-9356-1
171509	3	CENTER MAGNET CORE WITH POLE PIECE	8101-349
	4	MAGNET CORES (Pair) WITH POLE PIECES (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	8101-
104169	5	NUT	8265-359
	6	TAP BOLT, 3/8"-16 x 7/8" Hex.Hd. (Tin Pl.) for attaching Pole Piece to Top Plate	
145969	7	MAGNET COIL, 500-ohms	8133-365
171491	7a	MAGNET COIL, 200-ohms	8133-365
156500	7b	MAGNET COIL, 4.5-ohms	8133-365
171503	8	GASKET	8078-1510
183983	9	ARMATURE BRACKET	8303-125
152184	10	BOLT LOCK	8486-368
183899	11	SCREW	8098-256
171507	12	ARMATURE WITH COUNTERWEIGHT AND CORE PINS	8157-390
199626	13	PIVOT SCREW COMPLETE (Inc.1-13a and 1-13b)	12471-20
100402	13a	PIVOT SCREW ONLY	8378-375
535	13b	NUT	8109-1
	14	TERMINAL POST WITH NUTS AND WASHERS (Inc.1-14a, 1-20, 1-21, 1-22, 2-23 and 2-24)	12451-
130200	14a	TERMINAL POST ONLY, for Ref.14	8094-1192
	15	TERMINAL POST WITH NUTS AND WASHERS (Inc.1-15a, 1-20, 1-21, 1-22, 2-23, 2-24, 1-26 and 1-44)	12451-
158035	15a	TERMINAL POST ONLY, for Refs.15 and 18	8094-2125
	16	TERMINAL POST WITH NUTS AND WASHERS (Inc.1-16a, 1-20, 1-21, 2-22, 3-23, 2-24, 1-26 and 1-44)	12451-
131234	16a	TERMINAL POST ONLY, for Ref.16	8094-2125
	17	TERMINAL POST WITH NUT AND WASHER (Inc.1-17a, 1-20, 1-26 and 1-44)	12451-
184024	17a	TERMINAL POST ONLY, for Ref.17	8094-2125
	18	TERMINAL POST WITH NUTS AND WASHERS (Inc.1-15a, 1-20, 1-21, 3-22, 2-23, 1-26 and 1-44)	12451-
131245	19	TERMINAL POST (Contact Holder)	8094-2122
72948	20	NUT	8109-383

UNION SWITCH & SIGNAL CO.

PIECE	REF.	DESCRIPTION	DWG. REF.
69705	21	WASHER	7828-287
29103	22	NUT	8109-194
29102	23	WASHER	7828-139
29101	24	NUT	8109-193
104159	25	CONTACT TIP, Silver Alloy	8094-2376
134516	26	BOLT LOCK	8486-368
20686	27	WASHER	7828-108
	28	SCREW WITH NUT, WASHER AND LOCK WASHER (Inc.1-26, 1-27, 1-28a, 1-29 and 1-30)	12471-
57996	28a	SCREW ONLY, for Ref.28	8098-845
173737	29	NUT LOCK	8486-403
151836	30	NUT	8109-445
100403	31	MAGNETIC SHUNT	8250-109
199421	32	BOLT LOCK	8486-399
199452	33	SCREW	8098-1300
170966	34	CONTACT SPRING SUPPORT	9968-1014
178251	35	BOLT LOCK	8486-405
142673	36	SCREW	8098-1300
156580	37	SPRING STOP	8385-2191
210889	38	CONTACT SPRING WITH ELKONIUM TIP	8385-2253
150140	39	LOCK WASHER	8486-367
183898	40	CONNECTOR	8064-770
171092	41	BOLT LOCK	8486-405
	42	SCREW WITH NUT AND WASHER (Inc.1-26, 1-30 and 1-42a)	12471-
150166	42a	SCREW ONLY, for Refs.42 and 43	8098-550
	43	SCREW WITH NUT AND WASHER (Inc.1-30, 1-41 and 1-42a)	12471-
62977	44	SCREW	8098-845
183977	45	SUPPORT PLATE COMPLETE	12538-114
183897	46	BOLT LOCK	8486-399
162010	47	SCREW	8098-1300
141189	48	CONTACT SPRING SUPPORT	9968-702
	49	CONTACT SPRING WITH FLEXIBLE CONNECTOR	8385-2336
131258	50	SPRING LOCK	8486-367
155340	51	BOLT LOCK	8486-368
22621	52	INSULATING BUSHING	8095-199
183960	53	BACK TERMINAL POST WITH SILVER TIP	8094-2325
183975	54	BOLT LOCK	8486-399
1515	55	NUT	8109-23
171515	56	TERMINAL CONNECTOR WITH FLEXIBLE CONNECTOR	8064-714
171514	56a	TERMINAL CONNECTOR without Flexible Connector	8064-714

UNION SWITCH & SIGNAL CO.

PIECE	REF.	DESCRIPTION	DWG. REF.
171513	57	TERMINAL CONNECTOR WITH FLEXIBLE CONNECTOR	8064-766
171512	57a	TERMINAL CONNECTOR without Flexible Connector	8064-766
171511	58	TERMINAL CONNECTOR WITH FLEXIBLE CONNECTOR	8064-713
171510	58a	TERMINAL CONNECTOR without Flexible Connector	8064-713
209752	58b	FLEXIBLE CONNECTOR for Refs.56, 57 and 58	10934-100
183908	59	TERMINAL CONNECTOR WITH FLEXIBLE CONNECTOR	8064-768
183907	59a	TERMINAL CONNECTOR without Flexible Connector	8064-768
53392	59b	FLEXIBLE CONNECTOR for Ref.59	B-9998-6
183900	60	TERMINAL CONNECTOR without Flexible Connector	8064-767
	61	CLOTH TUBING, 0.118" I.D. x 0.178" O.D. x 3-3/8" long	
	62	BASE SCREW WITH NUTS AND WASHERS (Inc.1-62a, 1-64, 1-65 and 1-66)	12471-
184028	62a	BASE SCREW ONLY	8098-876
171473	63	GLASS CASE WITH VENTILATOR Ref.63a	C-9356-2
157612	63a	VENTILATOR	7318-78
171579	64	WASHER	8078-1499
116360	65	WASHER	7828-184
138218	66	NUT	8265-252
171589	67	NAME PLATE	8225-390
	68	SCREW, NO.4 x 5/16" Rd.Hd. Hardened (Tin Pl.)	
168826	69	WASHER	8078-1499
161195	70	WASHER	7828-176
199632	71	COIL LOCK	8735-784
171090	72	BACK STRAP	8162-241
134400	73	BOLT LOCK	8486-371
183962	74	FRONT TERMINAL POST WITH SILVER TIP	8094-2326
	75	CAP SCREW, 5/16"-18 x 3/4" Hex.Hd.S. (Cad.Pl.)	
102807	76	PARTS NECESSARY TO APPLY RECTIFIER TO "FN-16" FLASHER RELAY. (For suppression of radio interference originating in the operating contacts) (Inc.3-23, 1-78, 1-79 and 1-80)	C-9357-2
102808	77	PARTS NECESSARY TO APPLY CONDENSERS TO "FN-16" FLASHER RELAY. (For suppression of radio interference originating in the lamp contacts) (Inc.1-81, 1-82, 4-83 and 2-84)	C-9357-2
102258	78	RECTIFIER COMPLETE	12746-4
	79	JAM NUT, 1/4"-20 S.Hex. (Tin Pl.)	
	80	LOCK WASHER, 1/4" Pl.S. (3/32" x 1/16") (Tin Pl.)	
102786	81	L.H. CONDENSER COMPLETE	B-12549-36
102787	82	R.H. CONDENSER COMPLETE	B-12549-36
47290	83	CONNECTOR	8064-305
61336	84	CONNECTOR	8064-406
172590	85	SHELF TYPE SHOCK ABSORBER COMPLETE	12404-27
199782	86	WALL TYPE SHOCK ABSORBER COMPLETE	12404-28



Style "FN-16" 4N-4R and 2N-2R D. C. Flasher Relays

Style "FN-16" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

For complete Relays refer to Plate E-5051.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
103884	**2**	**Top Plate Only** (Without Cores)	C–9356–4
	3	**Pair of Main Cores** (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	C–9356–
171509	**4**	**Center Core with Pole Piece**	8101–349
104169	**5**	**Nut**	8265–359
	6	**Tap Bolt,** 3/8"-16x7/8" Hex. Hd. S. (Tin Pl.)	
171503	**7**	**Gasket**	8078–1510
183983	**8**	**Armature Bracket**	8303–125
152184	**9**	**Bolt Lock**	8486–368
183899	**10**	**Screw**	8098–256
103962	**11**	**Armature Complete**	8157–443
199626	**12**	**Trunnion Screw Complete** (Inc. 1-12a and 1-12b)	12471–20
100402	**12a**	**Trunnion Screw Only**	8378–375
535	**12b**	**Nut**	8109–1
	13	**Terminal Post with Nuts and Washers** (Inc. 1-13a, 3-18, 3-19, 1-20, 1-21, 1-22 and 1-23)	12451–
158035	**13a**	**Terminal Post Only,** for Refs. 13 and 14	8094–2125
	14	**Terminal Post with Nuts and Washers** (Inc. 1-13a, 2-17, 2-18, 1-19, 1-20, 1-21, 1-22 and 1-23)	12451–
	15	**Terminal Post with Nuts and Washers** (Inc. 1-15a, 2-17, 3-18, 1-19, 1-20, 1-21, 1-23 and 1-24)	12451–
103977	**15a**	**Terminal Post Only,** for Refs. 15 and 16	8094–2377
	16	**Terminal Post with Nuts and Washers** (Inc. 1-15a, 2-17, 5-18, 2-19, 1-20, 1-21, 1-23 and 1-24)	12451–
29101	**17**	**Nut**	8109–193

Style "FN-16" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
29102	**18**	**Washer**	7828–139
29103	**19**	**Nut**	8109–194
69705	**20**	**Washer**	7828–287
72948	**21**	**Nut**	8109–383
134516	**22**	**Screw Lock**	8486–368
62977	**23**	**Screw**	8098–845
210763	**24**	**Screw Lock**	8486–405
104067	**25**	**L.H. Connector with Flexible Connector** (For 4N-4R Relay)	8064–846
104066	**25a**	**L.H. Connector** without Flexible Connector	8064–846
137945	**26**	**Flexible Connector** for Refs. 25 and 27	10934–147
104065	**27**	**R.H. Connector with Flexible Connector** (For 4N-4R Relay)	8064–846
104064	**27a**	**R.H. Connector** without Flexible Connector	8064–846
104072	**28**	**R.H. Connector with Flexible Connector** (For 2N-2R and 4N-4R Relays)	8064–851
104071	**28a**	**R.H. Connector** without Flexible Connector	8064–851
135276	**29**	**Flexible Connector** for Ref. 28	10934–147
104074	**30**	**L.H. Connector with Flexible Connector** (For 2N-2R and 4N-4R Relays)	8064–851
104073	**30a**	**L.H. Connector** without Flexible Connector	8064–851
210822	**31**	**Flexible Connector** for Ref. 30	10934–147
171513	**32**	**Connector with Flexible Connector** (For 2N-2R and 4N-4R Relays)	8064–766
171512	**32a**	**Connector** without Flexible Connector	8064–766
209752	**33**	**Flexible Connector** for Ref. 32	10934–100

Style "FN-16" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
103973	**34**	**Lamp Contact Spring Complete** (Terminal Post Extension) for 4N-4R Relays	8385–2582
104090	**34a**	**Lamp Contact Spring Complete** (Terminal Post Extension) for 2N-2R Relays	8385–2582
104051	**35**	**R.H. Operating (Control) Contact Spring Complete** (For 2N-2R and 4N-4R Relays)	8385–2583
104053	**36**	**L.H. Operating (Control) Contact Spring Complete** (For 2N-2R and 4N-4R Relays)	8385–2583
104003	**37**	**Contact Spring**	8385–2580
104033	**38**	**Connector**	8064–850
104979	**39**	**Contact Spring Complete** for 4N-4R Relays	8385–2580
104088	**39a**	**Contact Spring Complete** for 2N-2R Relays	8385–2580
104981	**40**	**Lamp Contact Spring Complete** (Terminal Post Extension) for 4N-4R Relays	8385–2582
104982	**40a**	**Lamp Contact Spring Complete** (Terminal Post Extension) for 2N-2R Relays	8385–2582
104980	**41**	**Contact Spring Complete** for 4N-4R Relays	8385–2580
104978	**41a**	**Contact Spring Complete** for 2N-2R Relays	8385–2580
150140	**42**	**Lock Washer**	8486–367
171092	**43**	**Screw Lock**	8486–405
150166	**44**	**Screw**	8098–550
151836	**45**	**Nut** for Ref. 44	8109–445
103888	**46**	**Contact Spring Block (5-Way)**	9968–1236
	47	**Machine Screw,** No. 8-36x$\frac{11}{16}$" Fil. Hd. S. (Tin Pl.)	
	48	**Lock Washer,** No. 8 S. (Tin Pl.)	
100403	**49**	**Magnetic Shunt**	8250–109

Style "FN-16" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
199421	**50**	**Bolt Lock**	8486–399
199452	**51**	**Screw**	8098–1300
	52	**Machine Screw,** No. 14-24x3 3/8″ Flat Hd. S. (Tin Pl.) with Washers Refs. 53 and 54	
210592	**53**	**Washer**	8078–1503
38149	**54**	**Washer**	7826–98
171473	**55**	**Glass Case with Ventilator** Ref. 55a	C–9356–2
157612	**55a**	**Ventilator** for Ref. 55	7318–78
161195	**56**	**Washer**	7828–176
168826	**57**	**Washer**	8078–1499
104091	**58**	**Name Plate** for 4N-4R Relays	8225–520
104104	**58a**	**Name Plate** for 2N-2R Relays	8225–521
	59	**Screw,** No. 4x5/16″ Rd. Hd. Hardened (Tin Pl.)	
199632	**60**	**Coil Lock**	8735–784
171090	**61**	**Back Strap**	8162–241
	62	**Cap Screw,** 5/16″-18x3/4″ Hex. Hd. S. (Cad. Pl.)	
142777	**63**	**Tag (Marked—)**	8988–75
107232	**64**	**Tag (Marked+)**	8988–53
156500	**65**	**Coil,** 4.5-ohms	8133–365
171491	**65a**	**Coil,** 200-ohms	8133–365
145969	**65b**	**Coil,** 500-ohms	8133–365
102258	**66**	**Rectifier Complete**	12746–4
	67	**Lock Washer,** 1/4″ Pl. S. (3/32″x1/16″) (Tin Pl.)	
	68	**Jam Nut,** 1/4″ S. Hex. (Tin Pl.)	

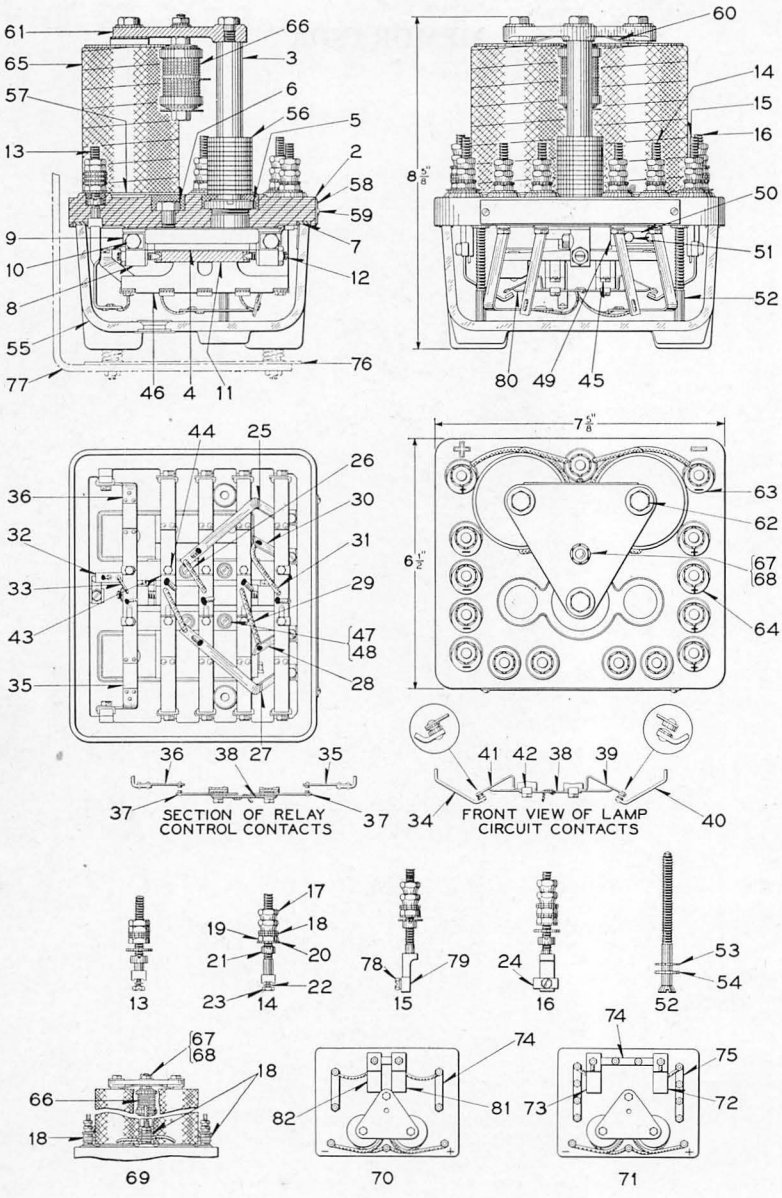
Style "FN-16" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102807	**69**	**Parts Necessary to Apply Rectifier to "FN-16" Flasher Relay** (For suppression of radio interference originating in the operating contacts) (Inc. 3-18, 1-66, 1-67 and 1-68)	C–9357–2
104919	**70**	**Parts Necessary to Apply Condensers to 2N-2R "FN-16" Flasher Relay** (For suppression of radio interference originating in the lamp contacts) (Inc. 1-72, 1-73 and 3-74)	C–9357–7
104918	**71**	**Parts Necessary to Apply Condensers to 4N-4R "FN-16" Flasher Relay** (For suppression of radio interference originating in the lamp contacts) (Inc. 1-72, 1-73, 1-74 and 8-75)	C–9357–6
102786	**72**	**L.H. Condenser Complete**	B–12549–36
102787	**73**	**R.H. Condenser Complete**	B–12549–36
147302	**74**	**Connector**	8064–305
47290	**75**	**Connector**	8064–305
172590	**76**	**Shelf Type Shock Absorber Complete** (For details see Ref. Ea, Plate E-5030)	12404–27
199782	**77**	**Wall Type Shock Absorber Complete** (Similar to Ref. Fa, Plate E-5030)	12404–28



Style "FN-16A" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

Style "FN-16A" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

For complete Relays refer to Plate E-5051.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
103884	**2**	**Top Plate Only** (Without Cores)	C–9356–4
257700	**3**	**Three Repair Cores** (All three cores should be replaced as the repair cores are ground to close tolerances in height)	8101–347
265733	**4**	**Center Pole Piece Only**	8250–134
104169	**5**	**Nut**	8265–356
	6	**Tap Bolt,** $\frac{3}{8}$"-16x$\frac{7}{8}$" Hex. Hd. S. (Tin Pl.)	
171503	**7**	**Gasket**	8078–1510
265736	**8**	**Armature Bracket**	8303–138
219875	**9**	**Bolt Lock**	7828–138
266121	**10**	**Screw**	8098–256
265694	**11**	**Armature Complete**	8157–443
199626	**12**	**Trunnion Screw Complete** (Inc. 1-12a and 1-12b)	12471–20
100402	**12a**	**Trunnion Screw Only**	8378–375
535	**12b**	**Nut**	8109–1
266649	**13**	**Terminal Post** with Nuts and Washers (Inc. 1-13a, 3-18, 3-19, 1-20, 1-21, 1-22 and 1-23)	12451–394
158035	**13a**	**Terminal Post Only,** for Refs. 13 and 14	8094–2125
170896	**14**	**Terminal Post** with Nuts and Washers (Inc. 1-13a, 2-17, 2-18, 1-19, 1-20, 1-21, 1-22 and 1-23)	12451–239
	15	**Terminal Post** with Nuts and Washers (Inc. 1-15a, 2-17, 3-18, 1-19, 1-20, 1-21, 1-24, 1-78 and 1-79)	12451–
103977	**15a**	**Terminal Post Only,** for Refs. 15 and 16	8094–2377
266650	**16**	**Terminal Post** with Nuts and Washers (Inc. 1-15a, 2-17, 5-18, 2-19, 1-20, 1-21, 1-23 and 1-24)	12451–394
29101	**17**	**Nut**	8109–193
29102	**18**	**Washer**	7828–139

Style "FN-16A" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

For complete Relays refer to Plate E-5051.

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
29103	**19**	**Nut**	8109–194
69705	**20**	**Washer**	7828–287
72948	**21**	**Nut**	8109–383
134516	**22**	**Screw Lock**	8486–368
62977	**23**	**Screw**	8098–845
210763	**24**	**Screw Lock**	8486–405
104067	**25**	**L.H. Connector** with Flexible Connector (For 4N-4R Relay)	8064–846
104066	**25a**	**L.H. Connector** without Flexible Connector	8064–846
137945	**26**	**Flexible Connector** for Refs. 25 and 27	10934–147
104065	**27**	**R.H. Connector** with Flexible Connector (For 4N-4R Relay)	8064–846
104064	**27a**	**R.H. Connector** without Flexible Connector	8064–846
104072	**28**	**R.H. Connector** with Flexible Connector (For 2N-2R and 4N-4R Relays)	8064–851
104071	**28a**	**R.H. Connector** without Flexible Connector	8064–851
135276	**29**	**Flexible Connector** for Ref. 28	10934–147
104074	**30**	**L.H. Connector** with Flexible Connector (For 2N-2R and 4N-4R Relays)	8064–851
104073	**30a**	**L.H. Connector** without Flexible Connector	8064–851
210822	**31**	**Flexible Connector** for Ref. 30	10934–147
171513	**32**	**Connector** with Flexible Connector (For 2N-2R and 4N-4R Relays)	8064–766
171512	**32a**	**Connector** without Flexible Connector	8064–766
209752	**33**	**Flexible Connector** for Ref. 32	10934–100
264181	**34**	**Lamp Terminal Post Complete**	8094–2482

Style "FN-16A" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

For complete Relays refer to Plate E-5051.

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
104051	**35**	**R.H. Operating (Control) Contact Spring Complete** (For 2N-2R and 4N-4R Relays)	8385–2583
104053	**36**	**L.H. Operating (Control) Contact Spring Complete** (For 2N-2R and 4N-4R Relays)	8385–2583
104003	**37**	**Contact Spring**	8385–2580
104033	**38**	**Connector**	8064–850
264185	**39**	**Contact Spring Complete**	8385–2852
264182	**40**	**Lamp Terminal Post Complete**	8094–2482
264184	**41**	**Contact Spring Complete**	8385–2582
150140	**42**	**Lock Washer**	8486–367
171092	**43**	**Screw Lock**	8486–405
150166	**44**	**Screw**	8098–550
151836	**45**	**Nut** for Ref. 44	8109–445
103888	**46**	**Contact Spring Block** (5-Way)	9968–1236
	47	**Machine Screw,** No. 8-36x$\frac{11}{16}$" Fil. Hd. S. (Tin Pl.)	
	48	**Lock Washer,** No. 8 S. (Tin Pl.)	
100403	**49**	**Magnetic Shunt**	8250–109
199421	**50**	**Bolt Lock**	8486–399
199452	**51**	**Screw**	8098–1300
	52	**Machine Screw,** No. 14-24x3$\frac{3}{8}$" Flat Hd. S. (Tin Pl.) with Washers Refs. 53 and 54.	
210592	**53**	**Washer**	8078–1503
38149	**54**	**Washer**	7826–98
171473	**55**	**Glass Case** with Ventilator Ref. 55a	C–9356–2
157612	**55a**	**Ventilator** for Ref. 55	7318–78

Style "FN-16A" 4N-4R and 2N-2R D. C. Flasher Relays

Detail Parts

For complete Relays refer to Plate E-5051.

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
161195	**56**	**Washer**	7828–176
168826	**57**	**Washer**	8078–1499
104091	**58**	**Name Plate** for 4N-4R Relays	8225–520
104104	**58a**	**Name Plate** for 2N-2R Relays	8225–521
	59	**Screw,** No. 4-40x¼″ Rd. Hd. Hardened (Tin Pl.)	
199632	**60**	**Coil Lock**	8735–784
171090	**61**	**Back Strap**	8162–241
	62	**Cap Screw,** $\frac{5}{16}$″-18x¾″ Hex. Hd. S. (Cad. Pl.)	
142777	**63**	**White Tag** (Marked —)	8988–75
107232	**64**	**Red Tag** (Marked +)	8988–53
156500	**65**	**Coil,** 4.5-ohms	8133–365
171491	**65a**	**Coil,** 200-ohms	8133–365
145969	**65b**	**Coil,** 500-ohms	8133–365
102258	**66**	**Rectifier Complete**	12746–4
	67	**Lock Washer,** ¼″ Pl. S. (M) (Tin Pl.)	
	68	**Jam Nut,** ¼″-20 S. Hex. (Tin Pl.)	
102807	**69**	**Parts Necessary to Apply Rectifier to "FN-16A" Flasher Relay** (For suppression of radio interference originating in the operating contacts) (Inc. 3-18, 1-66, 1-67 and 1-68)	C–9357–2
104919	**70**	**Parts Necessary to Apply Condensers to 2N-2R "FN-16A" Flasher Relay** (For suppression of radio interference originating in the lamp contacts) (Inc. 2-18, 1-81, 1-82, and 3-74)	C–9357–7
104918	**71**	**Parts Necessary to Apply Condensers to 4N-4R "FN-16A" Flasher Relay** (For suppression of radio interference originating in the lamp contacts) (Inc. 2-18, 1-72, 1-73, 1-74 and 8-75)	C–9357–6

Style "FN-16A" 4N-4R and 2N-2R D. C. Flasher Relays

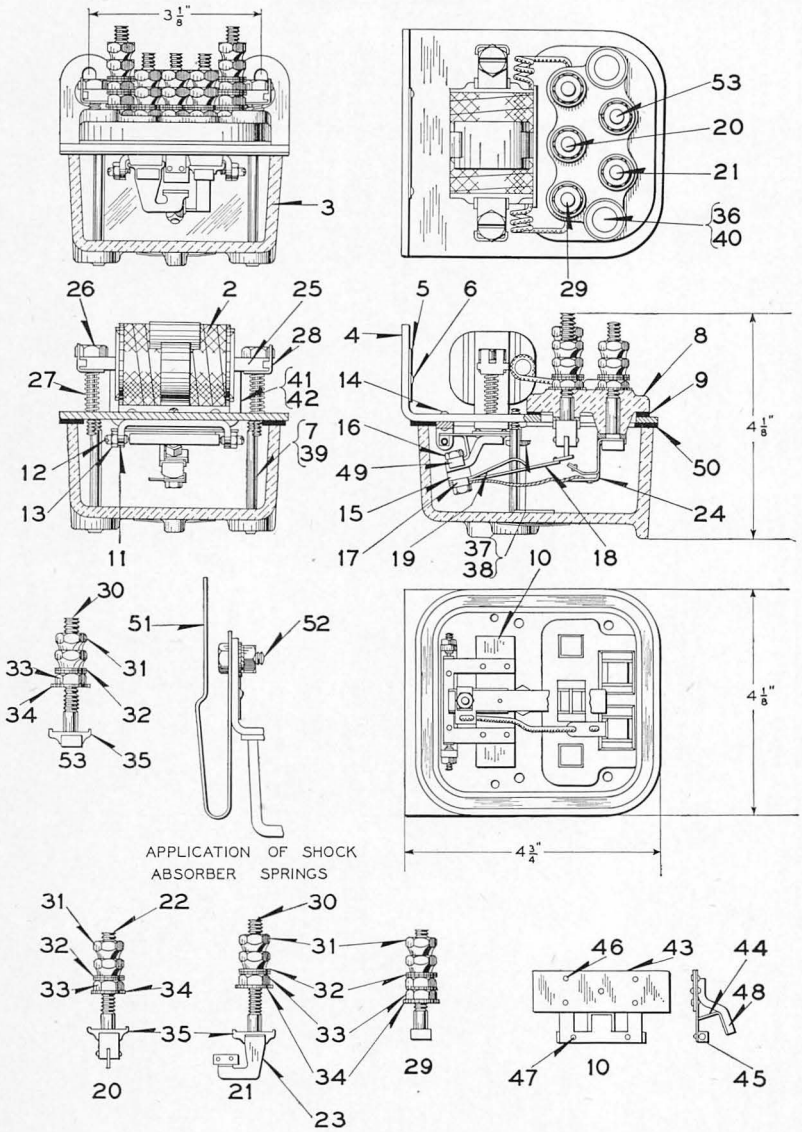
Detail Parts

For complete Relays refer to Plate E-5051.

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102786	72	**L.H. Condenser Complete** for 4N-4R Relays	B–12549–36
102787	73	**R.H. Condenser Complete** for 4N-4R Relays	B–12549–36
147302	74	**Connector**	8064–305
47290	75	**Connector**	8064–305
172590	76	**Shelf Type Shock Absorber Complete** (For details see Ref. Ea, Plate E-5030)	12404–27
199782	77	**Wall Type Shock Absorber Complete** (Similar to Ref. Fa, Plate E-5030)	12404-28
131239	78	**Screw**	8098–845
233321	79	**Lock Washer**	8486–433
264186	80	**Stop Spring**	8735–1084
261278	81	**L.H. Condenser Complete** for 2N-2R Relays	B–12549–36
261279	82	**R.H. Condenser Complete** for 2N-2R Relays	B–12549–36
268994	83	**Material Necessary to Change 2N-2R Style "FN-16" Relay** to have same contacts as Style "FN-16A" Relay (Inc. 2-34, 2-39, 2-40, 2-41, 4-78, 4-79, 4-80, 1-84 and 2-85) (Not Shown)	C–9357–7
268993	83a	**Material Necessary to Change 4N-4R Style "FN-16" Relay** to have same contacts as Style "FN-16A" Relay (Inc. 4-34, 4-39, 4-40, 4-41, 8-56, 8-78, 8-79, 8-80, 1-84 and 2-85) (Not Shown)	C–9357–6
265693	84	**Counterweight** (To replace counterweight on "FN-16" Armature) (Not Shown)	9672–245
54934	85	**Rivet** (For attaching Ref. 84 to Armature) (Not Shown)	10301–30



Style DNL-3 Single Point Relay Line and Track

Detail Parts

Style DNL-3 Single Point Relay Line and Track

Detail Parts

For complete Relays refer to Plate E-5076 covering the Style DNL-4 Relay. Use this Plate for ordering repair parts.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
135321	**2**	**Coil, Complete,** .14-Ohm	8133–346
135322	**2a**	**Coil, Complete,** 78-Ohms	8133–347
135842	**2b**	**Coil, Complete,** 44-Ohms	8133–347
136973	**2c**	**Coil, Complete,** .05 Ohm	8133–346
138134	**2d**	**Coil, Complete,** 125-Ohms	8133–347
138650	**2e**	**Coil, Complete,** 30-Ohms	8133–347
140303	**2f**	**Coil, Complete,** 8-Ohms	8133–347
141999	**2g**	**Coil, Complete,** 5-Ohms	8133–347
158282	**2h**	**Coil, Complete,** 295-Ohms	8133–347
178163	**2j**	**Coil, Complete,** 250-Ohms	8133–347
181850	**2k**	**Coil, Complete,** 60-Ohms	8133–347
157613	**3**	**Glass Case Complete with Ventilator**	8163–273
135314	**4**	**Top Plate, Complete with Magnet Cores and Armature Bracket** (Inc. 1-4a, 1-11, 2-14, 2-41 and 2-42)	10914–66
135313	**4a**	**Top Plate Only**	10914–66
135297	**5**	**Name Plate**	8225–262
	6	**Drive Screw** No. 4x$\frac{3}{16}$" (Nickel Plated) for attaching Ref. 5 to Ref. 4.	
	7	**Machine Screw** No. 10-30x2$\frac{1}{8}$" Flat Hd. Br. (Nickel Plated) for attaching Ref. 4 to Ref. 3.	
148846	**8**	**Terminal Board** with Gasket Ref. 9	9968–725
135326	**9**	**Gasket**	8078–1419
135289	**10**	**Armature, Complete**	8157–325
135298	**11**	**Armature Bracket** (Not tapped for Pivot Screws)	8303–97

Style DNL-3 Single Point Relay Line and Track

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
135299	12	**Pivot Screw**	8378–344
32498	13	**Hex. Nut** for Ref. 12	8109–223
54921	14	**Rivet.** For attaching Armature Bracket to Top Plate	10301–1
135301	15	**Stud**	8095–639
1515	16	**Hex. Nut** for Ref. 15	8109–23
135300	17	**Lock Washer** for Ref. 15	8486–374
135294	18	**Contact Spring, Complete**	8385–2010
135295	19	**Spring Stop**	11893–281
148624	20	**Front Terminal Post, Complete** (Inc. 1-22, 2-31, 2-32, 1-33, 1-34 and 1-35)	12451–246
148623	21	**Back Terminal Post, Complete** (Inc. 1-23, 1-30, 2-31, 2-32, 1-33, 1-34 and 1-35)	12451–245
135308	22	**Front Terminal Post, Complete with Silver Tip**	8094–2148
135306	23	**Back Post, Complete with Silver Tip**	8094–2149
135319	24	**Connector, Complete**	10934–70
135311	25	**Backstrap**	8162–218
135310	26	**Screw**	8190–361
135323	27	**Coil Spring**	8124–144
135296	28	**Lock Washer** for Ref. 26	8486–373
	29	**Terminal Post, with Nuts and Washers** (Inc. 1-29a, 2-31, 3-32, 2-33 and 1-34)	12451–
115706	29a	**Terminal Post Only,** for Ref. 29	8094–1192
130200	30	**Terminal Post Only,** for Refs. 21 and 53	8094–1192
29101	31	**Hex. Nut** for Refs. 20, 21, 29 and 53	8109–193
29102	32	**Washer** for Refs. 20, 21, 29, 52 and 53	7828–139

Style DNL-3 Single Point Relay Line and Track

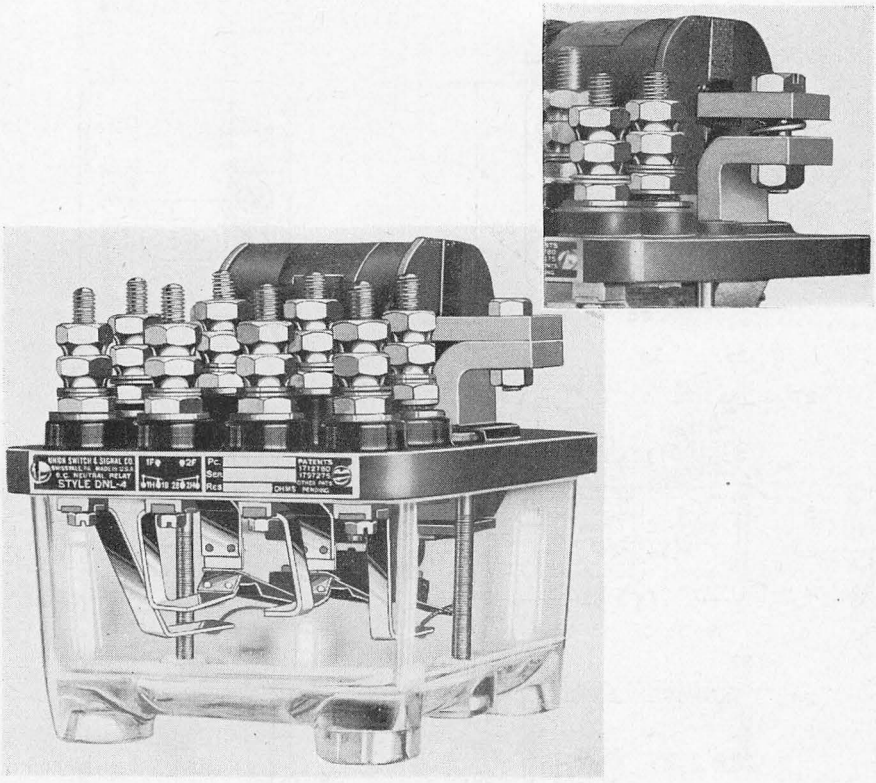
Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
29103	**33**	**Hex. Nut** for Refs. 20, 21, 29 and 53	8109–194
69705	**34**	**Washer** for Refs. 20, 21, 29 and 53	7828–287
121616	**35**	**Lock Washer** for Refs. 20, 21 and 53	8486–362
	36	**Machine Screw** No. 10-30x½″ Fil. Hd. Br. (Nickel Plated).	
136117	**37**	**Armature Adjusting Screw**	8098–429
29956	**38**	**Hex. Nut** for Ref. 37	8109–202
70539	**39**	**Lead Washer**	8274–73
44618	**40**	**Washer** for Ref. 36	7828–184
135315	**41**	**Core**	8101–309
54937	**42**	**Rivet.** For attaching Core to Top Plate	10301–50
135288	**43**	**Armature Only**	8157–325
135290	**44**	**Armature Support**	11893–282
135292	**45**	**Shaft Complete**	8160–174
37417	**46**	**Rivet**	10301–21
54928	**47**	**Rivet**	10301–21
160211	**48**	**Contact Support**	11893–486
157891	**49**	**Lock Washer** for Ref. 15	8486–368
150468	**50**	**Gasket**	8078–1452
151538	**51**	**Shock Absorber Spring**	8735–656
	52	**Tap Bolt,** ¼″-20x⅝″ Hex. Hd. (Cad. Pl.) with Washer Ref. 32, ¼″ Pl. S. Lock Washer (⅛″x$\frac{1}{16}$″) (Cad. Pl.) and ¼″-20 Hex. Nut (Cad. Pl.).	
	53	**Terminal Post with Nuts and Washers** (Inc. 1-30, 2-31, 2-32, 1-33, 1-34 and 1-35)	12451–

Remove Staple Before Filing in Loose Leaf Cover



WIDTH 4½", DEPTH 5", HEIGHT 4⅞"

STYLE "DNL-4" RELAY (ONE AND TWO POINT)

TRACK AND LINE

The Style DNL-4 Relay, like its predecessor the DNL-3, is used to close a local circuit for signal lighting upon the approach of trains. It effects a considerable saving in battery with no extra runs of line wire.

This relay is furnished for track or line application. Convenient adjustment of the backstrap provides for proper calibration for different track circuit conditions. Line relays are furnished with coils of the correct resistance for connection in series with a control relay for the signal in the rear.

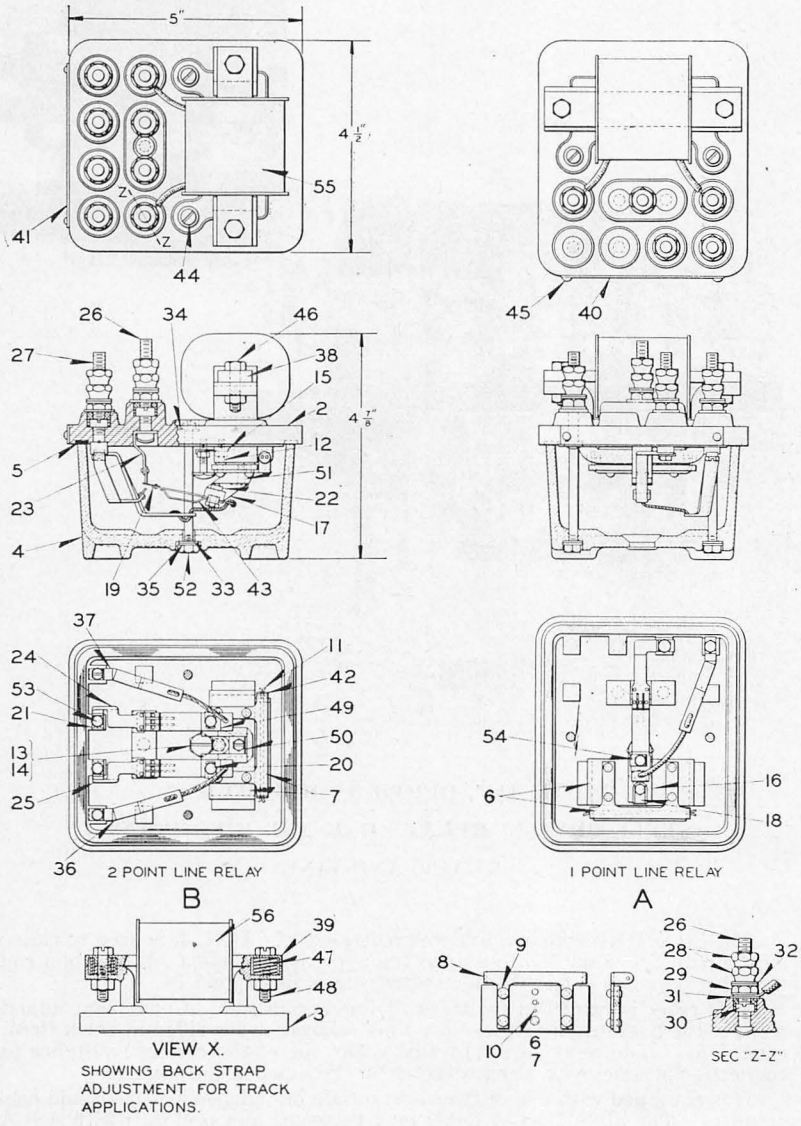
It is equipped with one or two substantial non-independent front and back contacts. The Style DNL-4 Relay may be sealed and conforms with A.R.A. (Signal Section) practice in regard to pivots, contacts and electrical clearances.

Aside from the resistance of the coils the track relay is distinguished from the line type in that it employs an adjustable back strap as shown in the insert above. Complete assemblies and detail ordering references are given in Plate E-5076.

Printed in U. S. A.

PLATE E-5076

UNION SWITCH & SIGNAL CO.



STYLE "DNL-4" ONE AND TWO POINT RELAYS
TRACK AND LINE

UNION SWITCH & SIGNAL CO.

STYLE "DNL-4" ONE AND TWO POINT RELAYS TRACK AND LINE

When ordering complete DNL-4 Line Relays, specify the resistance and type of line relay with which they are to be connected in series; also specify line resistance, type and number of cells of battery. Track relays will be wound with 0.14 Ohm coils unless otherwise specified. If wall mounting is required order shock absorber and bracket Ref. 57a, Plate E-5076.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style DNL-4 Line Relay Complete** as shown with one front and one back non-independent contacts....	C–9393–3
	Aa	**Style DNL-4 Track Relay Complete** with adjustable back strap (View "X") with one front and one back non-independent contacts.....	C–9393–3
	B	**Style DNL-4 Line Relay Complete** as shown with two front and two back non-independent contacts.....	C–9393–3
	Ba	**Style DNL-4 Track Relay Complete** with adjustable back strap (View "X") with two front and two back non-independent contacts.....	C–9393–3
179434	2	**Top Plate,** for Line Relays.....	9968–1085
179449	3	**Top Plate,** for Track Relays.....	9968–1085
179436	4	**Glass Case Complete** with Ventilator.....	8163–213
157612	4a	**Ventilator** for Ref. 4.....	7318–78
179431	5	**Gasket,** used between Top Plate and Case.....	8078–1545
182779	6	**Armature Complete,** with Bracket, Rivets and Pin (Inc. 1-7a, 1-8, 5-9 and 1-10) for One Point Relay...	8157–399
179438	7	**Armature Complete,** with Bracket and Rivet (without Pin Ref. 10) (Inc. 1-7a, 1-8 and 5-9) for Two Point Relay.....	8157–399
179437	7a	**Armature only,** for Refs. 6 and 7.....	8157–399
179439	8	**Armature Bracket** for Refs. 6 and 7.....	8303–117
54920	9	**Rivet,** for Refs. 6 and 7.....	10301–1
47013	10	**Pin,** for Ref. 6.....	8097–593

UNION SWITCH & SIGNAL CO.

STYLE "DNL-4" ONE AND TWO POINT RELAYS
TRACK AND LINE
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
179440	**11**	**Trunnion Pin**	8097–852
179820	**12**	**Armature Stop Pin**	8114–677
183245	**13**	**Back Stop Screw**	8098–1099
1506	**14**	**Nut,** for Ref. 13	8109–12
179443	**15**	**Nut Lock,** for Ref. 14	8486–399
141189	**16**	**Contact Spring Support** for One Point Relay	9968–702
150113	**17**	**Contact Spring Support,** for Two Point Relay	9968–849
155340	**18**	**Nut Lock**	8486–368
180974	**19**	**Contact Spring Complete,** with Flexible Connector	8385–2336
150166	**20**	**Screw**	8098–550
134516	**21**	**Nut Lock,** for Refs. 20 and 53	8486–368
151836	**22**	**Nut,** for Ref. 20	8109–445
179442	**23**	**Front Post Complete,** with Tip	8094–2307
179827	**24**	**R. H. Back Post Complete,** with Tip, for one Point Relay	8094–2309
179456	**24a**	**R. H. Back Post Complete,** with Tip, for two Point Relay	8094–2308
179455	**25**	**L. H. Back Post Complete,** with Tip	8094–2308
	26	**Terminal Post with Nuts and Washers** (Inc. 1-26a, 2-28, 1-29, 1-30, 1-31 and 2-32)	12451–
130593	**26a**	**Terminal Post only,** for Ref. 26	8094–1192

UNION SWITCH & SIGNAL CO.

STYLE "DNL-4" ONE AND TWO POINT RELAYS
TRACK AND LINE
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	27	**Terminal Post with Nuts and Washers** (Inc. 1-27a, 2-28, 1-29, 1-30, 1-31 and 2-32)	12451–
179821	27a	**Terminal Post only,** for Ref. 27	8094–2125
29101	28	**Nut**	8109–193
29103	29	**Nut**	8109–194
72948	30	**Nut**	8109–383
69705	31	**Washer**	7828–287
29102	32	**Washer**	7828–139
176217	33	**Washer,** for Ref. 44	8078–1407
15577	34	**Washer,** for Ref. 44	7828–67
83	35	**Washer,** for Ref. 44	7828–3
179819	36	**Terminal Connector (L. H.) Complete,** with Flexible Connector	8064–741
179823	37	**Terminal Connector (R. H.) Complete** with Flexible Connector	8064–741
179432	38	**Back Strap,** for Line Relays	8162–245
179450	39	**Back Strap,** for Track Relays	8162–245
180192	40	**Name Plate,** for One Point Relays	8225–416
180191	41	**Name Plate,** for Two Point Relays	8225–415
180944	42	**Washer**	7828–368
180975	43	**Stop Spring**	8735–769

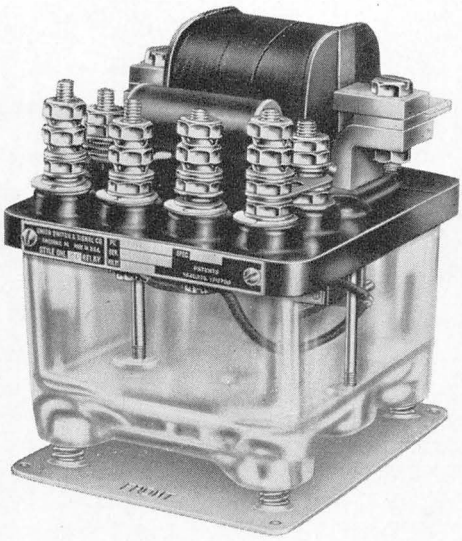
UNION SWITCH & SIGNAL CO.

STYLE "DNL-4" ONE AND TWO POINT RELAYS
TRACK AND LINE
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	44	**Machine Screw No. 10-30x2⅝″** Fil. Hd. Br. (N. P.).	
	45	**Drive Screw No. 4x¼″** Rd. Hd. (N. P.).	
162175	46	**Screw** with Nut Ref. 46a, for line relay	8098–921
63866	46a	**Nut** for Ref. 46	8265–100
179452	47	**Spring**	8124–218
179825	48	**Screw** with Nut Ref. 48a, for track relay	8190–361
112139	48a	**Nut** for Ref. 48	8109–70
150140	49	**Lock Washer,** for Ref. 20	8486–367
149339	50	**Lock Washer** for Ref. 51	8486–368
142673	51	**Screw**	8098–1300
26545	52	**Nut,** for Ref. 44	8109–181
131239	53	**Screw**	8098–845
131258	54	**Lock Washer**	8486–367
179447	55	**Coil Complete** with Leads (78-ohms) for Line Relays	8133–423
179446	56	**Coil Complete** with Leads (0.14-ohms) for Track Relays	8133–423
182823	57	**Shelf Type Shock Absorber Base Complete** For Style "DNL-4" Relay (Not shown) (Similar to Ref. E, Plate E-5030, dimensions W-2⅞″, X-3⅜″, Y-4⅞″, Z-5⅜″)	12404–27
182822	57a	**Wall Type Shock Absorber Base Complete** For Style "DNL-4" Relay (Not shown) (Similar to Ref. F, Plate E-5030 except that the 6½″ dimension is 4½″ and dimension V-2⅞″)	12404–28

File Plates in Proper Sequence
in Loose Leaf Covers



Width 4½″, Depth 5″, Height 5⅜″
(including shelf type shock absorber)

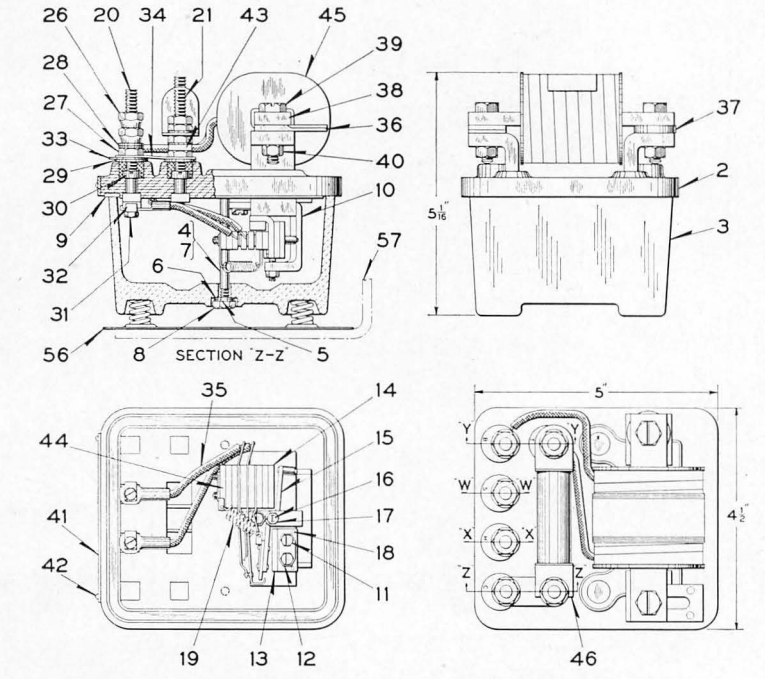
Style "DNL-46" Two-Rate Charge Relays

"DNL-46E" FOR EDISON ALKALINE CELLS
"DNL-46L" FOR LEAD STORAGE CELLS

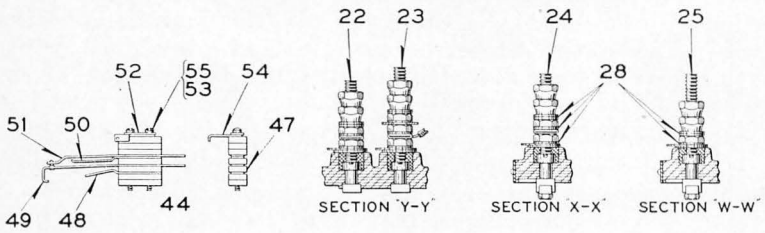
Style "DNL-46E" and "DNL-46L" Relays are intended for use in connection with the charging of storage cells. The final charged voltage of such cells is higher with higher charge rates and lower with higher temperatures. To meet these two conditions the "DNL-46E" and "DNL-46L" Relays have been provided with proper temperature compensation and means for adjusting the operating voltage to suit the charge rate.

It is a well recognized fact that to keep a battery fully charged at a predetermined trickle charge rate and at the same time not incur danger of over-charging, requires diligent maintenance and frequent readjustment of the trickle charge rate. In the two-rate charge method, the battery is automatically trickle charged at a low rate sufficient to take care of the internal losses and the steady load on the battery, and each time the battery is called upon to deliver an additional load, the charge rate is increased to a higher value. This high rate is continued until the battery is substantially recharged, at which time the "DNL-46E" or "DNL-46L" Relay reduces the high rate to the low trickle charge rate.

For ordering references, see next page; for typical circuit, see last page of this plate.



A - FOR LEAD CELLS
B - FOR EDISON CELLS



Style "DNL-46E" and "DNL-46L" Two-Rate Charge Relays

Style "DNL-46E" and "DNL-46L" Two-Rate Charge Relays

Shelf Type Shock Absorber Base (Ref. 56) or Wall Type Shock Absorber Base (Ref. 57) are always furnished for use with each relay and are shipped separately. Shelf Type is furnished unless otherwise called for on order.

Relays for combinations of cells other than those listed below can be furnished upon request. In ordering state number of cells used and whether Lead Acid or Edison-Alkaline Type.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "DNL-46L" Two-Rate Charge Relay for Charging Lead Storage Batteries.

Piece	Ref.	Number of Cells	Can also be adjusted for number of Cells	Coil Ref.	Resistor Ref.	Drawing Reference
208764	**A**	4	5	45b	46b	C–9393–7
211234	**Aa**	5	6	45c	46c	C–9393–7
192576	**Ab**	6	7	45d	46d	C–9393–7
215536	**Ac**	8	9	45e	46e	C–9393–7
199757	**Ad**	10	11 and 12	45f	46f	C–9393–7
216024	**Ae**	15	16 to 20 inclusive	45g	46g	C–9393–7
215563	**Af**	50	51 to 60 inclusive	45f	46h	C–9393–7

Style "DNL-46E" Two-Rate Charge Relay for Charging Edison Storage Batteries.

Piece	Ref.	Number of Cells	Can also be adjusted for number of Cells	Coil Ref.	Resistor Ref.	Drawing Reference
213559	**B**	7	8	45	46	C–9393–7
214415	**Ba**	9	10	45a	46a	C–9393–7

Piece	Ref.	Description	Drawing Reference
192481	**2**	**Top Plate**	9968–1121
179436	**3**	**Glass Case** with Ventilator	8163–213
157612	**3a**	**Ventilator** for Ref. 3	7318–78
	4	**Machine Screw**, No. 10-30x2⅝″ Fil. Hd. Br. (N.P.) with Nut and Washers (Inc. 1-5, 1-6, 1-7 and 1-8)	
83	**5**	**Washer**	7828–3

Style "DNL-46E" and "DNL-46L" Two-Rate Charge Relays

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
176217	**6**	**Washer**	8078–1407
15577	**7**	**Washer**	7828–67
26545	**8**	**Nut**	8109–181
179431	**9**	**Gasket**	8078–1545
194790	**10**	**Armature Bracket Complete**	8303–129
162010	**11**	**Screw**	8098–1300
179443	**12**	**Bolt Lock**	8486–399
194792	**13**	**Pole Piece**	8250–104
194793	**14**	**Pole Piece**	8250–104
192491	**15**	**Armature Complete**	8157–426
	16	**Pivot Screw** with Nut Ref. 17	12471–
194797	**16a**	**Pivot Screw Only**	8378–382
32498	**17**	**Nut**	8109–223
128260	**18**	**Pin**	8097–872
192526	**19**	**Spring**	8124–166
	20	**Terminal Post with Nuts and Washers** (Inc. 1-20a, 2-26, 1-27, 2-28, 1-29 and 1-30)	12451–
130200	**20a**	**Terminal Post Only** for Refs. 20, 21 and 22	8094–1192
	21	**Terminal Post with Nuts and Washers** (Inc. 1-20a, 4-27, 2-28, 1-29, 1-30 and 1-43)	12451–
	22	**Terminal Post with Nuts and Washers** (Inc. 1-20a, 2-26, 2-27, 4-28, 1-29 and 1-30)	12451–
	23	**Terminal Post with Nuts and Washers** (Inc. 1-23a, 2-26, 3-27, 5-28, 1-29 and 1-30)	12451–
112417	**23a**	**Terminal Post Only**, for Ref. 23	8094–1192

Style "DNL-46E" and "DNL-46L" Two-Rate Charge Relays

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	24	**Terminal Post with Nuts and Washers** (Inc. 1-24a, 2-26, 2-27, 4-28, 1-29, 1-30, 1-31 and 1-32)	12451–
194798	24a	**Terminal Post Only,** for Refs. 24 and 25	8094–2235
	25	**Terminal Post with Nuts and Washers** (Inc. 1-24a, 2-26, 1-27, 3-28, 1-29, 1-30, 1-31 and 1-32)	12451–
29101	26	**Nut**	8109–193
29103	27	**Nut**	8109–194
29102	28	**Washer**	7828–139
69705	29	**Washer**	7828–287
72948	30	**Nut**	8109–383
131239	31	**Screw**	8098–845
164349	32	**Bolt Lock**	8486–368
142777	33	**Tag** (Orders should specify marking desired)	8988–75
47290	34	**Terminal Connector**	8064–305
194799	35	**Lead Complete**	B–9991–13
192522	36	**Magnetic Gap Slider Complete**	9999–1121
192523	37	**Spacer**	8072–798
179432	38	**Back Strap**	8162–245
	39	**Bolt** with Nut Ref. 40	12471–
179825	39a	**Bolt Only**	8190–361
112139	40	**Nut**	8109–70
192563	41	**Name Plate**	8225–476
	42	**Screw,** No. 4-40x¼" Rd. Hd. (Tin Pl.)	
31068	43	**Spacer**	7828–144

Style "DNL-46E" and "DNL-46L" Two-Rate Charge Relays

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

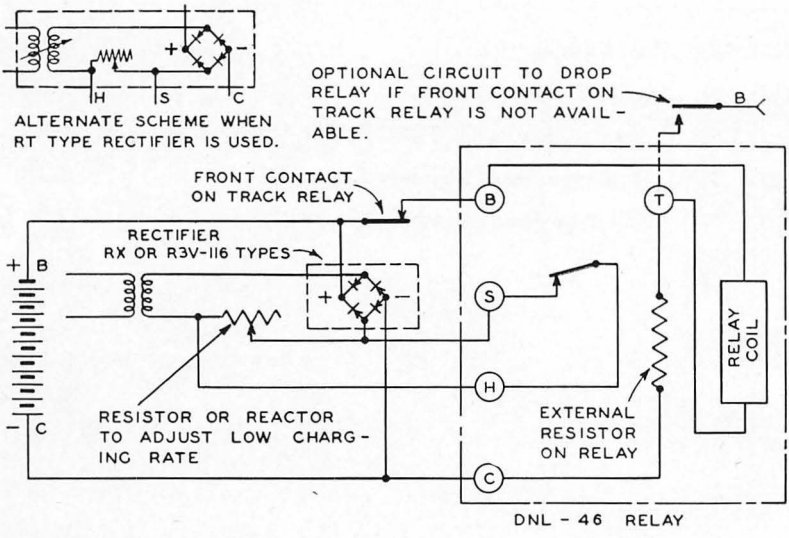
Piece	Ref.	Description	Drawing Reference
108220	**44**	**Contact Assembly Complete**	B–12660–32
213558	**45**	**Coil Complete,** 9-Ohms	8133–457
214416	**45a**	**Coil Complete,** 13.4-Ohms	8133–457
208765	**45b**	**Coil Complete,** 19-Ohms	8133–457
211233	**45c**	**Coil Complete,** 29-Ohms	8133–457
192558	**45d**	**Coil Complete,** 44-Ohms	8133–457
215535	**45e**	**Coil Complete,** 73-Ohms	8133–457
199759	**45f**	**Coil Complete,** 120-Ohms	8133–457
216023	**45g**	**Coil Complete,** 260-Ohms	8133–457
213703	**46**	**Resistor,** 40-Ohms	9065–152
214418	**46a**	**Resistor,** 60-Ohms	9065–152
208767	**46b**	**Resistor,** 65-Ohms	9065–152
211232	**46c**	**Resistor,** 100-Ohms	9065–152
150987	**46d**	**Resistor,** 150-Ohms	9065–152
186165	**46e**	**Resistor,** 250-Ohms	9065–152
199760	**46f**	**Resistor,** 400-Ohms	9065–152
216022	**46g**	**Resistor,** 900-Ohms	9065–152
215999	**46h**	**Resistor,** 2400-Ohms	9065–152
174235	**47**	**Insulation**	8750–2503
187904	**48**	**Stop Spring**	8385–2429
192538	**49**	**Contact Spring Complete**	8385–2429
152726	**50**	**Stop Spring**	8385–2166
152725	**51**	**Contact Spring Complete**	8385–2166
152720	**52**	**Washer**	7828–275

Style "DNL-46E" and "DNL-46L" Two-Rate Charge Relays

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
152735	**53**	**Ins. Bushing**	B–10266–1
192445	**54**	**Spring Holding Clip**	11893–757
	55	**Machine Screw,** No. 3-56x1⅛" Fil. Hd. S. (N.P.)	
182823	**56**	**Shelf Type Shock Absorber Base**	12404–27
182822	**57**	**Wall Type Shock Absorber Base**	12404–28



Typical Circuit Application of Style "DNL-46" Relay

File Plates in Proper Sequence
in Loose Leaf Covers

Style "L-10" Relays

Relays constructed along the lines of the Style "L-10" are not classed as A.A.R. relays. Recommendations have been confined to those applications where a failure would be checked by an approved A.A.R. relay or where such failure would create no unsafe condition. Style "L-10" Relay construction features do, however, provide for:

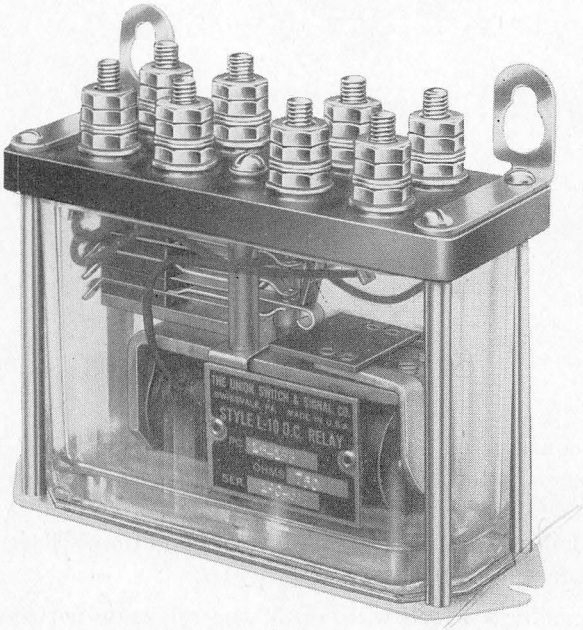
(a) Ruggedness which will permit the relays to withstand millions of operations without serious wear.

(b) Contacts of a very dependable nature.

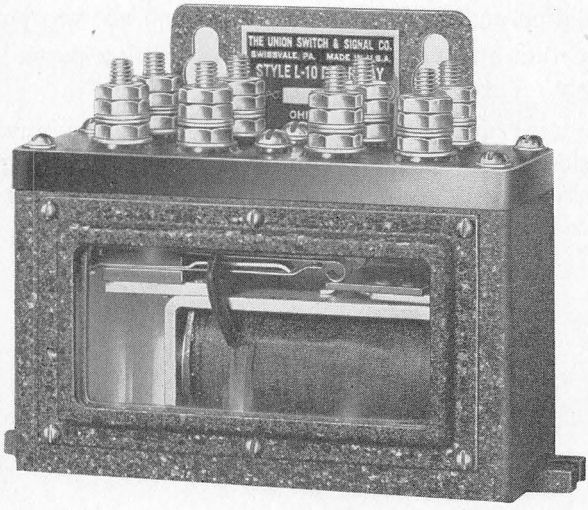
(c) Insulation and other materials which will not warp or deteriorate.

(d) Protection and visibility of coil and moving parts. All of which greatly reduce maintenance effort.

Its major applications are, to control a reserve or more restrictive light signal indication in case of lamp failure, as a light out or light indication relay, and in coding sets, to provide approach indications for multiple track over two line wires.



B



C

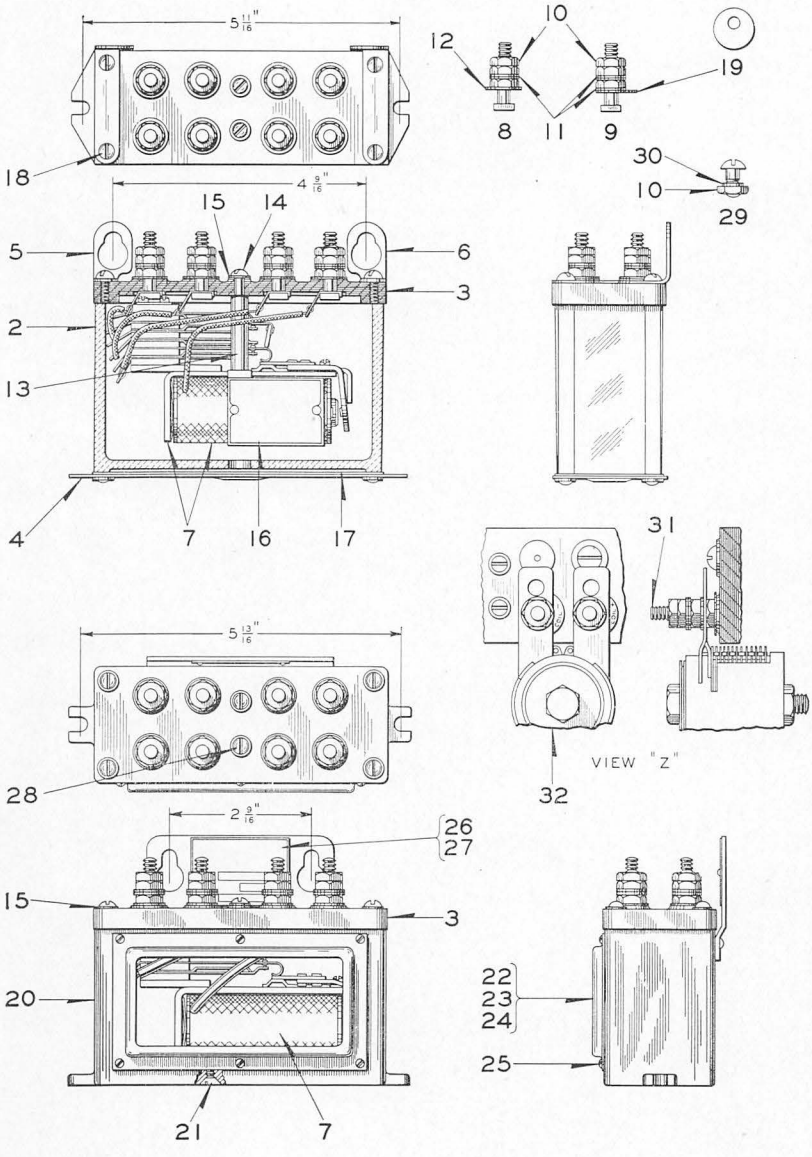
Style "L-10" Relays

Style "L-10" Relays

For details refer to Plate E-5082.
For Relay Units refer to Plate E-5086.
For Contact Combinations refer to Plate E-5088.
For details of original design of "L-10" Relays refer to Plate E-5085.
For "OR-10" and "OR-11" Relays refer to Plate E-5090.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	B	**Style "L-10" Relay in Glass Case** (Orders should specify Contact Combination desired by referring to Plate E-5088 and resistance of Magnet Coil Plate E-5086)	B–12671–
	Ba	**Style "L-10" Relay in Glass Case with Rectifier** as shown in View "Z" of Plate E-5082 (for Light Out service) (Orders should specify Contact Combination desired by referring to Plate E-5088 and resistance of Magnet Coil Plate E-5086)	B–12671–
	C	**Style "L-10" Relay in Cast Aluminum Case** (Orders should specify Contact Combinations desired by referring to Plate E-5088, and resistance of Magnet Coil Plate E-5086)	B–12671–
		Contact Capacity: Style "L-10" Relays may have a maximum of eight terminal posts on the top plate, two for coil leads and six for contacts. Therefore, with the exception of Relay Unit Reference B, Plate E-5086, the maximum number of independent contacts is three. Additional dependent contact capacity is made possible by the use of common heel springs for front and back contacts or by means of internal jumper connections. Each contact stack with the exception of Reference E, Plate E-5088 is limited to six contact springs and the maximum number of stacks are shown in assemblies A to E inclusive of Plate E-5086. Orders should specify the combination desired from Plate E-5088.	
		Contact Rating: Style "L-10" Relay contacts should be limited to 4 amperes A.C. or D.C. at 15 volts maximum, non-inductive. Heavy inductive loads should be snubbed where possible. The standard contact material is silver to silver and the contact tips are split so that contact is made at least at one point if the other point does not make good contact.	



Style "L-10" Relay Details

Style "L-10" Relay

Detail Parts

For complete Relays refer to Plate E-5080.
For Relay Units refer to Plate E-5086.
For Contact Combinations refer to Plate E-5088.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
156835	**2**	**Case**	8163–302
178104	**3**	**Terminal Board**	9968–1071
156869	**4**	**Base Plate Complete**	11893–470
156870	**5**	**L.H. Bracket**	11893–471
156871	**6**	**R.H. Bracket**	11893–471
	7	**Relay Unit** (When ordering refer to Plate E-5086)	B–12671–
	8	**Terminal Post with Nuts and Washers** (Used when Tag Ref. 19 is not used) (Inc. 1-9a, 3-10, 2-11 and 1-12)	12451–
	9	**Terminal Post with Nuts, Washers and Tag** (Inc. 1-9a, 3-10, 3-11 and 1-19) (Orders should specify marking desired on Tag)	12451–
123633	**9a**	**Terminal Post Only,** for Refs. 8 and 9	8094–1192
29103	**10**	**Nut**	8109–194
29102	**11**	**Washer**	7828–139
29104	**12**	**Washer**	7828–138
178602	**13**	**Spacer**	8350–660
	14	**Machine Screw,** No. 10-30x1 7/8" Rd. Hd. Br. (N.P.) (For Relays using Spacer Ref. 13)	
	14a	**Machine Screw,** No. 10-30x 9/16" Rd. Hd. Br. (N.P.) (For Relays not using Spacer Ref. 13)	
44618	**15**	**Washer**	7828–184
163284	**16**	**Name Plate Complete** (D.C. Name Plate)	11893–511
213341	**16a**	**Name Plate Complete** (For Slow Acting Relay) (D.C. Name Plate)	11893–511
213340	**16b**	**Name Plate Complete** (A.C. Name Plate)	11893–511

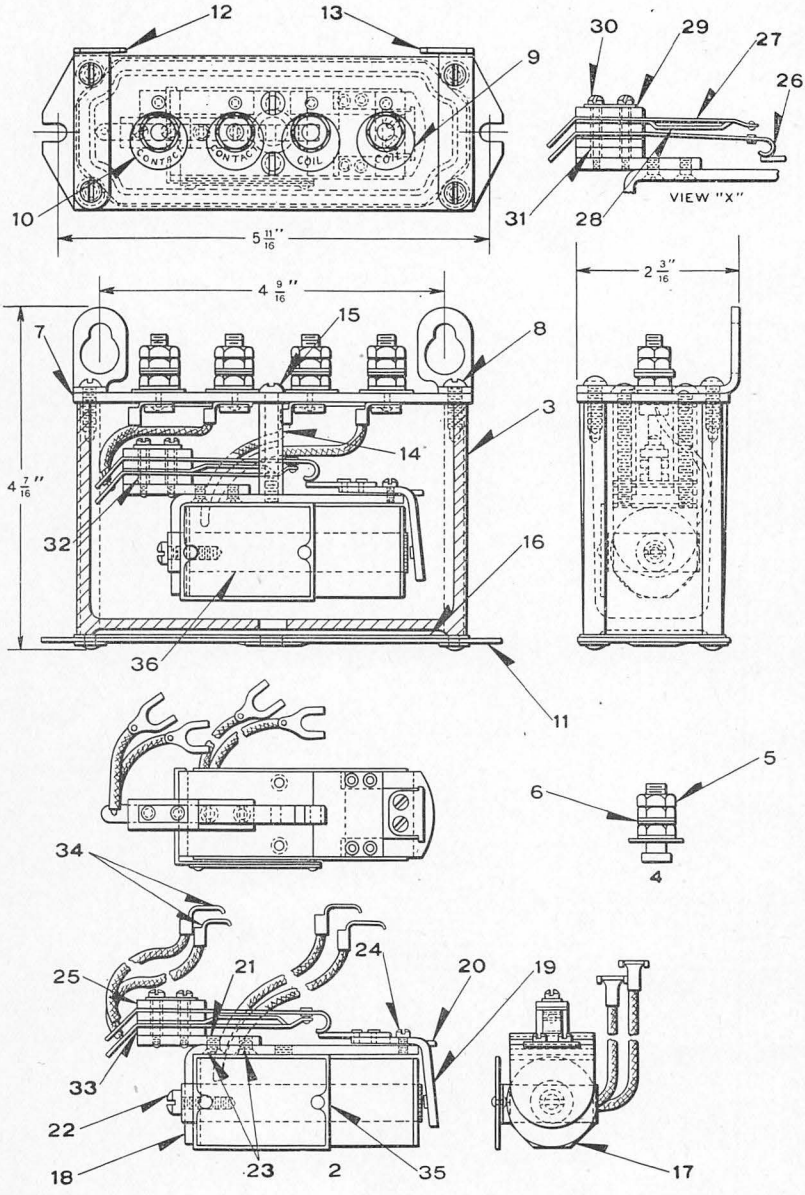
Style "L-10" Relay

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
157959	**17**	**Gasket**	8078–1473
	18	**Machine Screw,** No. 8-36x¾" Rd. Hd. Br. (N.P.)	
142777	**19**	**Tag** (Orders should specify marking desired)	8988–75
186969	**20**	**Case with Bracket**	B–12674–3
	21	**Machine Screw,** No. 8-36x$\frac{7}{16}$" Flat Hd. Br. (N.P.)	
154843	**22**	**Glass Retainer**	11893–449
154939	**23**	**Gasket**	8078–1460
154840	**24**	**Glass**	8163–294
	25	**Machine Screw,** No. 4-48x$\frac{3}{16}$" Rd. Hd. Br. (N.P.)	
154834	**26**	**Name Plate**	8225–330
	27	**Drive Screw,** No. 4x$\frac{3}{16}$" Rd. Hd. Hardened (Cad. Pl.)	
	28	**Machine Screw,** No. 10-30x½" Rd. Hd. Br. (N.P.) with two Washers Ref. 15 and one Nut Ref. 28a	
26942	**28a**	**Nut** for Ref. 28	8109–184
	29	**Machine Screw,** No. 14-24x½" Rd. Hd. Br. (N.P.) with Nut Ref. 10 and Washer Ref. 30 (For plugging holes in Top Plate when Terminal Posts are not used)	
53627	**30**	**Washer**	7828–218
	31	**Terminal Post with Nuts and Washers** (Inc. 1-31a, 4-10 and 3-11)	12451–
186848	**31a**	**Terminal Post Only** for Ref. 31	8094–2207
170328	**32**	**Style "RE-4" Rectifier** (For details see Plate S-625)	C–9135–58



Details of Style "L-10" D. C. Relay (1-Point)

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "L-10" D. C. RELAY (1 POINT)

For Complete Relays Refer to Plate E-5080.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

1 Point Style "L-10" D. C. Relay Unit (Without Case)

Piece	Ref.	Ohms	Coils	Contact Combination	Drawing Reference
154832	**2**	.028	Ref. 17	O. F. & 1 B. (Low Voltage)	B–12671–3
154833	**2a**	780	Ref. 17a	1F & O. B. (Low Voltage)	B–12671–3
157116	**2b**	0.275	Ref. 17b	O. F. & 1B. (Low Voltage)	B–12671–3
157001	**2c**	.055	Ref. 17c	O. F. & 1B. (Low Voltage)	B–12671–3
157889	**2d**	245	Ref. 17d	1F & O. B. (Low Voltage)	B–12671–3
159802	**2e**	0.275	Ref. 17b	1F. & O. B. (Low Voltage)	B–12671–3

Piece	Ref.	Description	Drawing Reference
156835	**3**	**Case** only for Style L-10 Relay	8163–302
	4	**Terminal Post** with Nuts and Washers (Inc. 1-4a, 3-5 and 2-6)	12451
37154	**4a**	**Terminal Post** only, for Ref. 4	8094–757
49	**5**	**Nut**	8109–1
53	**6**	**Washer**	7828–5
156883	**7**	**Terminal Board only**	9968–920
	8	**Machine Screw No. 8-36x½″** Rd. Hd. B. for fastening Ref. 7 to Case.	
142777	**9**	**Tag** (Lettered "Coil")	8988–75
142777	**10**	**Tag** (Lettered "Contact")	8988–75

PLATE E-5085

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "L-10" D. C. RELAY

(1 POINT)

(Continued)

For Complete Relays Refer to Plate E-5080.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
156869	**11**	**Base Plate**	11893–470
156870	**12**	**L. H. Bracket**	11893–471
156871	**13**	**R. H. Bracket**	11893–471
156866	**14**	**Spacer**	8350–660
	15	**Machine Screw No. 10-30x1½″** Rd. Hd. Br.	
157959	**16**	**Gasket**	8078–1473
154871	**17**	**Coil** (.028 ohms) for Ref. 2	8133–383
154872	**17a**	**Coil** (780 ohms) for Ref. 2a	8133–383
157115	**17b**	**Coil** (.275 ohms) for Ref. 2b and 2e	8133–383
157000	**17c**	**Coil** (.055 ohms) for Ref. 2c	8133–383
157888	**17d**	**Coil** (245 ohms) for Ref. 2d	8133–383
156867	**18**	**Back Strap**	8162–230
152744	**19**	**Armature**	8157–355
152756	**20**	**Armature Stop**	11893–432
156872	**21**	**Contact Plate**	11893–469
	22	**Machine Screw No. 10-30x½″** Fil. Hd. S.	
	23	**Machine Screw No. 6-40x¼″** Flat Hd. S. for fastening Ref. 21 to Ref. 18.	
	24	**Machine Screw No. 6-40x$\frac{3}{16}$″** Fil. Hd. S.	
152719	**25**	**Insulation**	8750–1460

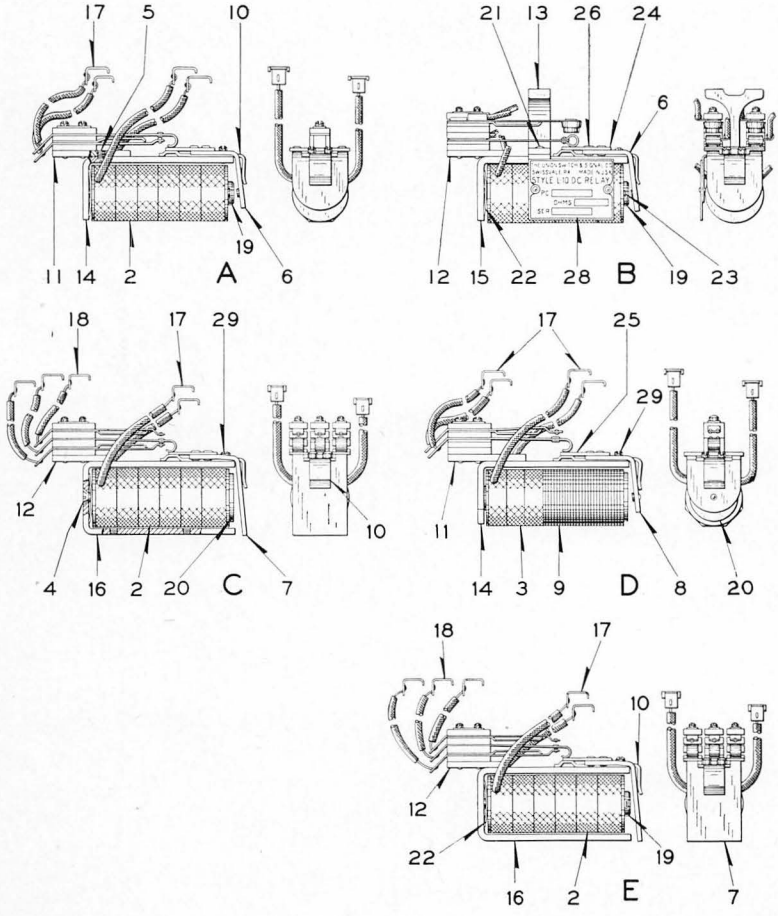
UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "L-10" D. C. RELAY
(1 POINT)
(Continued)

For Complete Relays Refer to Plate E-5080.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
152728	**26**	**Contact Spring**	8385–2167
152725	**27**	**Contact Spring**	8385–2166
152726	**28**	**Contact Spring Stop**	8385–2166
152720	**29**	**Washer**	7828–275
	30	**Machine Screw No. 3-56x5/8″** Fil. Hd. S.	
152732	**31**	**Insulating Bushing (7/16″ Long)**	B–10266–1
152733	**32**	**Insulating Bushing (39/64″ Long)**	B–10266–1
152718	**33**	**Insulation**	8750–1460
133634	**34**	**Slotted Terminal**	8244–120
156864	**35**	**Name Plate with Strap**	11893–468
152759	**36**	**Magnet Core**	8101–304



Relay Units for Style "L-10" Relays

Style "L-10" Relay

Detail Parts

Relay Units

For Complete Relays refer to Plate E-5080.
All Coils listed on this Plate include Terminal Connectors on Leads.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**1-Way Style "L-10" Relay Unit** (For use in Glass Case) (Orders should specify requirements by referring to Refs. 2 to 3 of this Plate for Magnet Coil and to Plate E-5088 for Contact Assemblies)	
	B	**2-Way Style "L-10" Relay Unit with Silver to Silver Imp. Carbon Contacts** (For use in Glass Case) (Orders should specify requirements by referring to Refs. 2 to 3 of this Plate for Magnet Coil and to Plate E-5088 for Contact Assemblies)	
	C	**3-Way Style "L-10" Relay Unit** (Large Core Face, for use in Metal Case) (Orders should specify requirements by referring to Refs. 2 to 3 of this Plate for Magnet Coil and to Plate E-5088 for Contact Assemblies)	
	D	**1-Way Style "L-10" Relay Unit** (Slow Acting, for use in Glass Case) (Orders should specify requirements by referring to Ref. 3 of this Plate for Magnet Coil and to Plate E-5088 for Contact Assemblies)	
	E	**3-Way Style "L-10" Relay Unit** (Small Core Face, for use in Metal Case) (Orders should specify requirements by referring to Refs. 2 to 3 of this Plate for Magnet Coil and to Plate E-5088 for Contact Assemblies)	
154871	**2**	**Coil,** 0.028-Ohms	8133–382
157000	**2a**	**Coil,** 0.055-Ohms	8133–382
174412	**2b**	**Coil,** 0.10-Ohms	8133–382
168201	**2c**	**Coil,** 0.220-Ohms	8133–382
157115	**2d**	**Coil,** 0.275-Ohms	8133–382
210195	**2e**	**Coil,** 0.88-Ohms	8133–382
187524	**2f**	**Coil,** 2-Ohms	8133–382
185200	**2g**	**Coil,** 4.5-Ohms	8133–382

Style "L-10" Relay

Detail Parts

Relay Units

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
194602	**2h**	**Coil,** 7-Ohms	8133–382
209146	**2j**	**Coil,** 20-Ohms	8133–382
183250	**2k**	**Coil,** 72-Ohms	8133–382
187730	**2 m**	**Coil,** 112-Ohms	8133–382
157888	**2n**	**Coil,** 175-Ohms	8133–382
165214	**2p**	**Coil,** 280-Ohms	8133–382
168445	**2q**	**Coil,** 425-Ohms	8133–382
154872	**2r**	**Coil,** 750-Ohms	8133–382
170996	**3**	**Coil,** 240-Ohms (For Slow Acting Relay Unit)	8133–407
	4	**Machine Screw,** No. 10-30x⅝" Flat Hd. S. (N.P.)	
	5	**Machine Screw,** No. 6-40x¼" Flat Hd. S. (N.P.)	
185954	**6**	**3-Way Armature with Insulation, Rivets and Core Pin** (Core Pin unfiled) for Refs. A and B	8157–355
156361	**7**	**3-Way Armature with Insulation and Rivets.** For Refs. C and E	8157–363
166135	**7a**	**2-Way Armature with Insulation, Rivets and Stop Pins.** For Ref. C	8157–381
185960	**8**	**1-Way Armature with Insulation, Rivets and Core Pin** (Core Pin unfiled) for Ref. D	8157–355
158914	**9**	**Washer** for Ref. D (28 required)	7828–363
152756	**10**	**Armature Stop**	11893–432
156872	**11**	**Contact Plate** for Refs. A and D	11893–434
152751	**12**	**Contact Plate** for Refs. B, C and E	11893–434
106134	**13**	**Supporting Bracket** for Ref. B	8231–75
156867	**14**	**Back Strap** for Refs. A and D	8162–230

Style "L-10" Relay

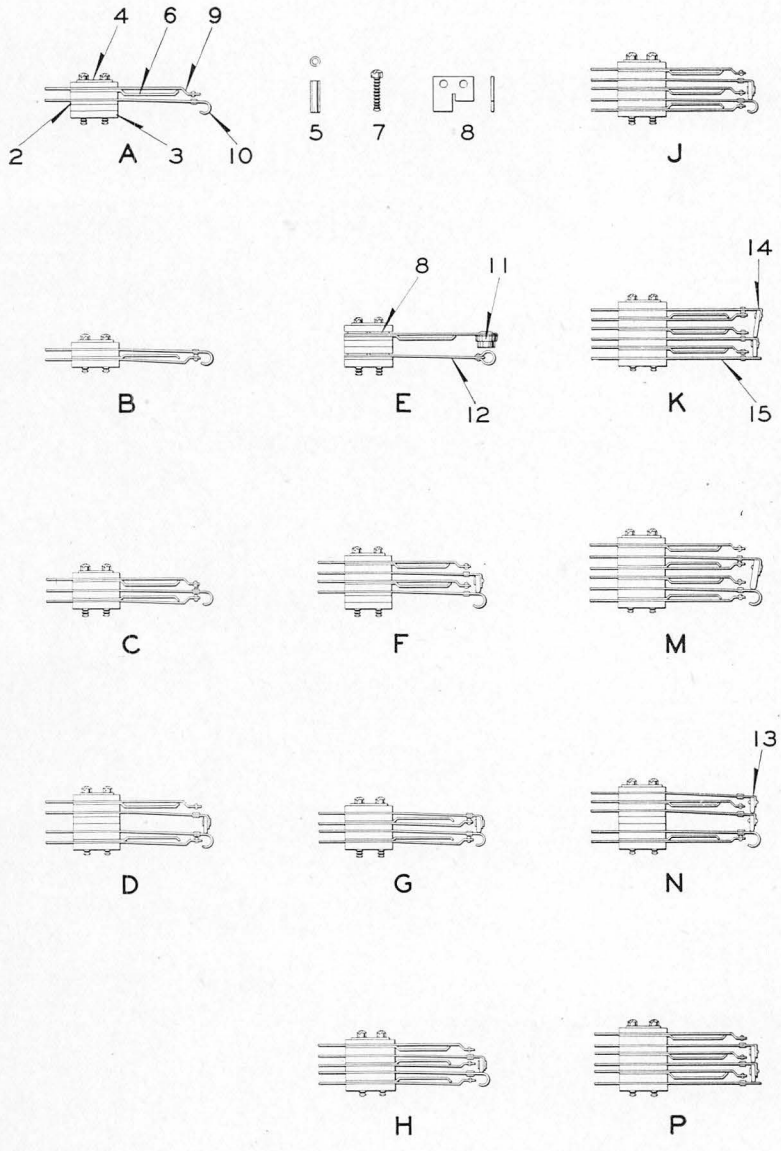
Detail Parts

Relay Units

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
106137	**15**	**Back Strap** for Ref. B	8162–230
185816	**16**	**Back Strap** for Refs. C and E	8162–228
122306	**17**	**Terminal** for Refs. A, B and D and all Coils	8244–112
185844	**18**	**Terminal** for Refs. C and E except coils	8244–112
161589	**19**	**Magnet Core Complete** for Refs. A, B and E	8101–304
169124	**20**	**Magnet Core Complete** for Refs. C and D	8101–346
	21	**Machine Screw,** No. 10-30x$\frac{5}{16}$″ Flat Hd. S. (Tin Pl.)	
175630	**22**	**Spring Washer**	7828–374
	23	**Cotter,** $\frac{1}{16}$″x$\frac{3}{4}$″ (N.P.)	
152737	**24**	**3-Way Armature Bakelite**	8750–2321
171146	**25**	**1-Way Armature Bakelite**	8750–2471
143762	**26**	**Eyelet Rivet.** For attaching armature bakelite to armature	12579–2
	27	**Tubing,** .097″ I.D.x.157″ O.D. (Specify length desired) (Not shown)	
163284	**28**	**Name Plate** with Strap for Ref. B	11893–511
	29	**Machine Screw,** No. 6-40x$\frac{5}{32}$″ Fil. Hd. S. (N.P.)	



Contact Sections for Style "L-10" Relays

Style "L-10" Relay

Detail Parts

Contact Sections

Refs. K, M, N and P can be used in Glass Case only because of the height of these stacks.
For Complete Relays refer to Plate E-5080.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
190196	**A**	**One Front Contact Stack Assembly**	B–12660–4
185048	**B**	**One Back Contact Stack Assembly**	B–12660–4
168500	**C**	**One Front and One Back Contact Stack Assembly**	B–12660–4
	D	**One Front and One Back Independent Contact Stack Assembly**	B–12660–4
	E	**One Front Contact Stack Assembly**	B–12660–26
171123	**F**	**Two Front Contact Stack Assembly**	B–12660–4
168502	**G**	**Two Back Contact Stack Assembly**	B–12660–4
190199	**H**	**One Front and Two Back Contact Stack Assembly**	B–12660–4
168501	**J**	**Two Front and One Back Contact Stack Assembly**	B–12660–4
102337	**K**	**Two Front Ind. and One Back Ind. Contact Stack Assembly** (For use in Glass Case only)	B–12660–23
190216	**M**	**Two Front and Two Back Contact Stack Assembly** (For use in Glass Case only)	B–12660–21
	N	**Ind. One Front and One Back Special with Extra Load Spring** (For use in Glass Case only)	B–12660–24
190221	**P**	**Three Front Contact Stack Assembly** (For use in Glass Case only)	B–12660–23
152718	**2**	**Insulation,** $\frac{1}{16}$" Thick	8750–1460
174235	**3**	**Insulation,** $\frac{1}{8}$" Thick	8750–2503
152720	**4**	**Plate**	7828–275
152733	**5**	**Ins. Bushing,** length $\frac{37}{64}$"	B–10266–1
168557	**5a**	**Ins. Bushing,** length $\frac{57}{64}$"	B–10266–1
152732	**5b**	**Ins. Bushing,** length $\frac{13}{32}$"	B–10266–1
160279	**5c**	**Ins. Bushing,** length $\frac{23}{32}$"	B–10266–1

Style "L-10" Relay

Detail Parts

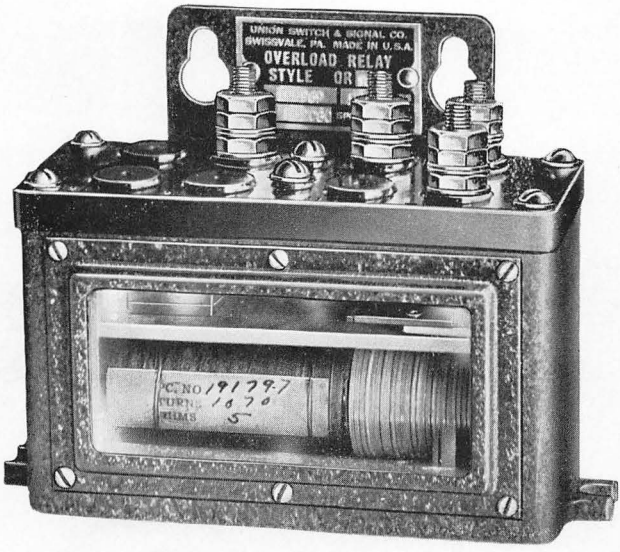
Contact Sections

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
175482	**5d**	**Ins. Bushing,** length $\frac{29}{32}$"	B–10266–1
160283	**5e**	**Ins. Bushing,** length $1\frac{1}{64}$"	B–10266–1
160299	**5f**	**Ins. Bushing,** length $1\frac{1}{32}$"	B–10266–1
152736	**5g**	**Ins. Bushing,** length $1\frac{3}{64}$"	B–10266–1
152726	**6**	**Contact Spring Stop**	8385–2166
	7	**Machine Screw,** 3-56x$\frac{5}{8}$" Fil. Hd. S. (N.P.)	
	7a	**Machine Screw,** 3-56x$\frac{13}{16}$" Fil. Hd. S. (N.P.)	
	7b	**Machine Screw,** 3-56x$\frac{15}{16}$" Fil. Hd. S. (N.P.)	
	7c	**Machine Screw,** 3-56x1$\frac{1}{8}$" Fil. Hd. S. (N.P.)	
	7d	**Machine Screw,** 3-56x1$\frac{1}{4}$" Fil. Hd. S. (N.P.)	
166018	**8**	**Connector**	8244–142
152725	**9**	**Contact Spring Complete**	8385–2166
152728	**10**	**Contact Spring Complete**	8385–2167
106086	**11**	**Contact Spring Complete** (Silver Imp. Carbon Tip)	8385–2611
106084	**12**	**Contact Spring Complete**	8385–2610
152730	**13**	**Contact Spring Complete**	8385–2167
161331	**14**	**Contact Spring Complete**	8385–2227
173103	**15**	**Contact Spring Complete**	8385–2290

Remove Staple Before Filing Plate in Loose Leaf Cover



STYLES "OR-10" AND "OR-11" OVERLOAD RELAYS

Styles "OR-10" and "OR-11" Relays are used as an effective element in a simple scheme providing overload protection for d-c. switch machines. One of these relays is placed in the motor operating circuit and picks up when excessive current flows, to deenergize another relay (or relays) controlling the supply of energy to operate the motor.

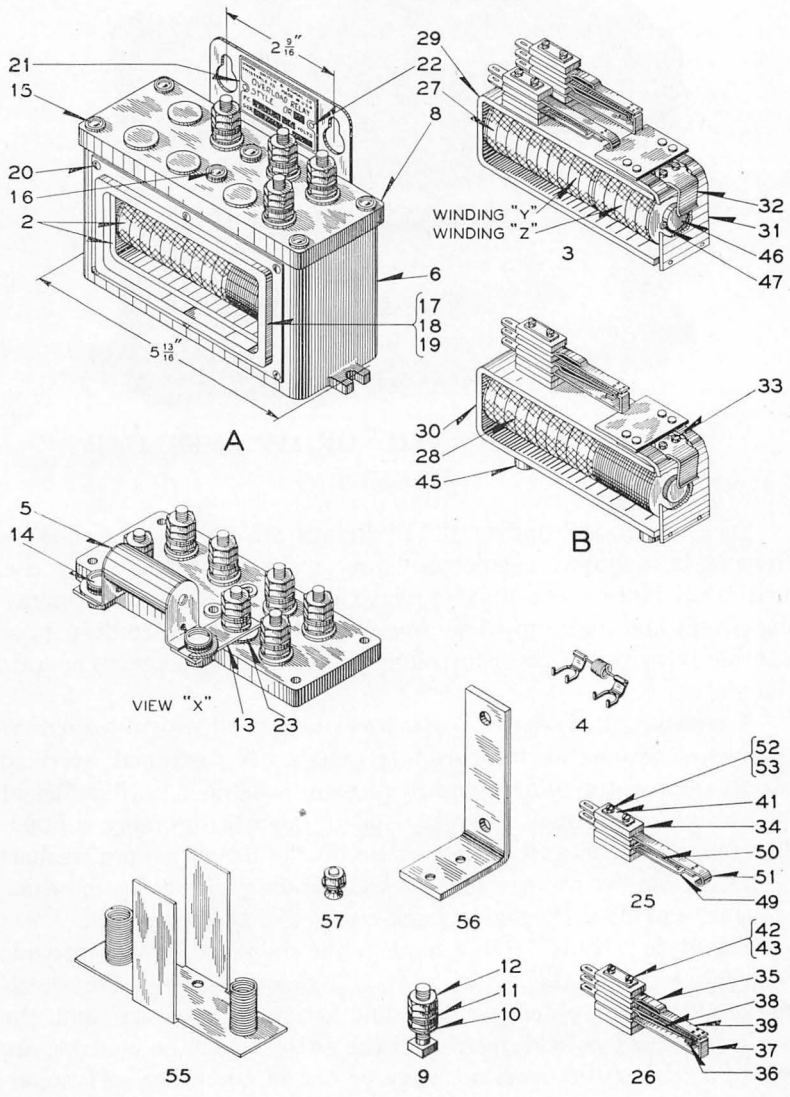
A resistor consisting of a few turns of special resistance wire is connected across the relay coil terminals. A sustained overload causes the resistor to heat and increase in resistance until sufficient current passes through the relay coil to operate the relay contact. The relay is made slow-acting either by the use of copper washers on its core or by the use of a second winding, the turns of which are short-circuited through a back contact of the relay.

The Style "OR-10" Relay employs the copper washers to provide retardation while the Style "OR-11" Relay employs the short-circuited coil for obtaining the slow action. To assure that the overload circuit is held open until the switch machine controls are reversed, either the overload relay or one of the other relays controlled by it, must be of the "stick" type. The Style "OR-11" Relay is a "stick" relay and combines the functions of an overload relay and a "stick" relay into one unit.

See Style "OR-20" Overload Relay (Plate C-2893) for a-c. control of Switch Machines.

PLATE E-5090

UNION SWITCH & SIGNAL CO.



STYLES "OR-10" AND "OR-11" OVERLOAD RELAYS

UNION SWITCH & SIGNAL CO.

STYLES "OR-10" AND "OR-11" OVERLOAD RELAYS

For Overload Protection of D. C. Low Voltage Switch Machines

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
195969	**A**	**Style "OR-10" D.C. Overload Relay** mounted in Case, with one continuity contact and Resistor Ref. 4 (non-stick Type)	B–12739–2
192910	**Aa**	**Style "OR-11" D.C. Overload Relay** mounted in Case, with Resistors Refs. 4 and 5 (Per View "X") and one back and one continuity contacts (Stick Type)	B–12739–2
	B	**Style "OR-10" D.C. Overload Relay Unit** (Non-stick Type) with one continuity contact and Resistor Ref. 4a, for use with contactor Controller. (Specify whether contactor is for wall mounting, Plate C-2870, or in cast iron box, Plate C-2869)	B–12739–
	Ba	**Material Necessary for Replacing TA-2 Thermal Relays with OR-10 Relay** for use with contactor controller. (Specify whether contactor is for wall mounting, Plate C-2870, or in cast iron box, Plate C-2869) (Includes 1-B, 1-4a, 1-55, 1-56 and 2-57)	B–12739–
196147	**2**	**Style "OR-10" Relay Unit** with one continuity contact (non-stick Type) for Ref. A	B–12739–3
192909	**3**	**Style "OR-11" Relay Unit** with one back and one continuity contacts (Stick Type) for Ref. Aa	B–12739–1
193214	**4**	**Resistor** (.035 Ohms Resistance) for Refs. A and Aa.	9065–257
191805	**4a**	**Resistor** (.011 Ohms Resistance) for Ref. B (straight wire)	9065–253
193213	**5**	**Resistor** (35 Ohms Resistance) for Ref. Aa	9065–227
192908	**6**	**Case Complete**	B–12674–3
	7	**Machine Screw** No. 8-36x$\frac{7}{16}$" Flat Hd. Br. (N.P.) for attaching Relay Unit to Case (Not shown)	
178104	**8**	**Terminal Board**	9968–1071

UNION SWITCH & SIGNAL CO.

STYLES "OR-10" AND "OR-11" OVERLOAD RELAYS

For Overload Protection of D. C. Low Voltage Switch Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	9	**Terminal Post** with Nuts and Washers (Inc. 1-9b, 1-10, 2-11 and 3-12)	12451–
	9a	**Terminal Post** with Nuts and Washers (Inc. 1-9b, 2-11 and 3-12)	12451–
123633	**9b**	**Terminal Post Only,** for Refs. 9 and 9a	8094–1192
29104	**10**	**Washer**	7828–138
29102	**11**	**Washer**	7828–139
29103	**12**	**Nut**	8109–194
193149	**13**	**Resistor Mounting Plate**	12538–145
	14	**Machine Screw,** No. 14-24x½" Rd. Hd. Br. (N.P.) with two Washers Ref. 11, Nut Ref. 12 and ¼" Pl. S. Lock Washer ($\frac{1}{16}$"x$\frac{1}{16}$") (Cad. Pl.)	
	15	**Machine Screw,** No. 8-36x¾" Rd. Hd. Br. (N.P.) with Washer Ref. 15a	
44618	**15a**	**Washer** for Refs. 15 and 16	7828–184
	16	**Machine Screw,** No. 10-30x⅝" Rd. Hd. Br. (N.P.) with two Washers Ref. 15a and Nut Ref. 16a	
26942	**16a**	**Nut**	8109–184
154843	**17**	**Glass Retainer**	11893–449
154840	**18**	**Glass Shield**	8163–294
154939	**19**	**Gasket**	8078–1460
	20	**Machine Screw,** No. 4-48x$\frac{3}{16}$" Rd. Hd. Br. (N.P.)	
185391	**21**	**Name Plate**	8225–459

UNION SWITCH & SIGNAL CO.

STYLES "OR-10" AND "OR-11" OVERLOAD RELAYS

For Overload Protection of D. C. Low Voltage Switch Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	22	**Drive Screw,** No. 4x$\frac{3}{16}$" Rd. Hd. Hardened (Cad. Pl.)	
142777	23	**Tag** (Orders should specify marking desired)	8988–75
	24	**Black Varnished Cambric Tubing,** .097" I.D. x .157" O.D. (Orders should specify length desired) (Not shown)	
	25	**One Back Contact Stack Assembly Complete**	B–12660–27
	26	**One Continuity Contact Stack Assembly Complete**	B–12660–27
193054	27	**Magnet Coil Complete with Core,** Winding "Y"-5.0 Ohms and Winding "Z"-65.0 Ohms (Stick Type) for Ref. 3	8133–458
191797	28	**Magnet Coil Complete with Core and Copper Washers** 5.0 Ohms (Non-stick type) for Refs. 2 and B	8133–433
192906	29	**Back Strap** for Refs. 2 and 3	8162–259
191798	30	**Back Strap** for Ref. B	8162–254
166135	31	**Armature Complete**	8157–381
152756	32	**Armature Stop**	11893–432
	33	**Machine Screw,** No. 6-40x$\frac{5}{32}$" Fil. Hd. S. (N.P.)	
174235	34	**Insulation**	8750–2503
182145	35	**Contact Spring Stop**	8385–2344
182150	36	**Contact Spring Complete**	8385–2347
182207	37	**Contact Spring Complete**	8385–2348
182146	38	**Contact Spring Stop**	8385–2345

UNION SWITCH & SIGNAL CO.

STYLES "OR-10" AND "OR-11" OVERLOAD RELAYS

For Overload Protection of D. C. Low Voltage Switch Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
182148	**39**	**Contact Spring Complete**	8385–2346
	40	**Machine Screw,** No. 10-30x$\frac{5}{8}$" Flat Hd. S. (N.P.) for Refs. 2 and 3. For attaching Coil to Back Strap (Not shown)	
152720	**41**	**Washer**	7828–275
160279	**42**	**Ins. Bushing,** $\frac{23}{32}$" long	B–10266–1
	43	**Machine Screw,** No. 3-56x$\frac{15}{16}$" Fil. Hd. S. (N.P.)	
	44	**Machine Screw,** No. 10-30x$\frac{3}{4}$" Fil. Hd. S. (N.P.) with No. 10 Pl. S. Lock Washer ($\frac{1}{16}$"x$\frac{3}{64}$") (N.P.) For Ref. B. For attaching Magnet Coil to Back strap (Not shown)	
191895	**45**	**Stud**	8114–875
193058	**46**	**Magnet Core Complete**	8101–377
	47	**Cotter Pin,** $\frac{1}{16}$"x$\frac{3}{4}$" S. (N.P.)	
175630	**48**	**Spring Washer** (Not shown) (Used between backstrap and coil)	7828–374
152725	**49**	**Contact Spring Complete**	8385–2166
152726	**50**	**Contact Spring Stop**	8385–2166
152728	**51**	**Contact Spring Complete**	8385–2167
161846	**52**	**Ins. Bushing,** $\frac{35}{64}$" long	B–10266–1
	53	**Machine Screw,** No. 3-56x$\frac{3}{4}$" Fil. Hd. S. (N.P.)	
170857	**54**	**Jumper** (Not shown) (Used between + and — Terminal Posts when testing Movements)	8064–711

UNION SWITCH & SIGNAL CO.

STYLES "OR-10" AND "OR-11" OVERLOAD RELAYS

For Overload Protection of D. C. Low Voltage Switch Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
191803	**55**	**Shock Absorber Spring** (Used when Relay Ref. B is attached to Contactor Circuit Controller) (If desired, orders should so state).....	12404–33
191802	**56**	**Support** for attaching Shock Absorber Spring Ref. 55 to Contactor Controller.....	10914–659
	57	**Machine Screw,** No. 10-30x3/8" Flat Hd. S. with No. 10 Lock Washer and Hex. Nut for attaching Ref. 55 to 56.	

Section
E

Plates E-5100, 5110, 5111, 5150, 5160 and 5161

RELAYS, INDICATORS AND ELECTRIC LOCKS

D. C. Relays

Style "DX-13" Interlocking and Style "DP-14" Polarized Relays

(Reprinted June, 1930
Supersedes Issue of September, 192)

Union Switch & Signal Co.
Swissvale, Pa.

6-30

Printed in U.S.A.

Remove Staple Before Filing Pages in Loose Leaf Cover

UNION SWITCH AND SIGNAL COMPANY

SECTION E

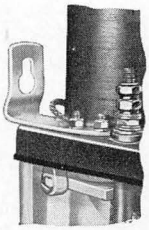
PLATES E-5100 TO E-5161

STYLE DX-13 INTERLOCKING RELAY AND MODEL "DP-14" POLARIZED RELAYS

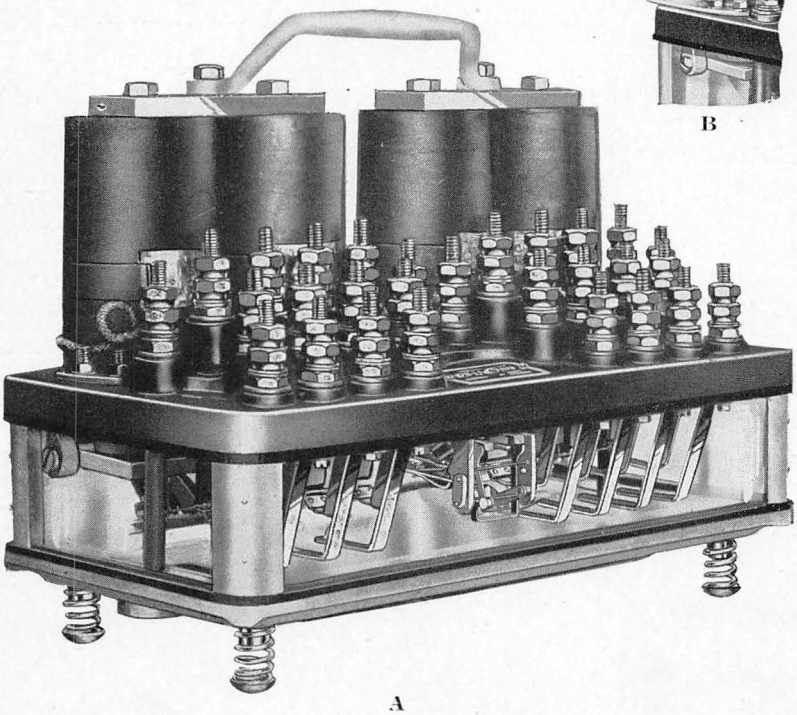
TABLE OF CONTENTS

	PLATE
STYLE "DX-13" D.C. INTERLOCKING RELAY	E-5100
MODEL "DP-14" FOUR POINT POLARIZED RELAY (TWO NORMAL AND TWO REVERSE POLAR CONTACTS)	E-5110
MODEL "DP-14" FOUR AND SIX POINT POLARIZED RELAY (FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)	E-5111
DETAILS OF STYLE "DX-13" D.C. INTERLOCKING RELAY	E-5150
DETAILS OF MODEL "DP-14" FOUR POINT POLARIZED RELAY (TWO NORMAL AND TWO REVERSE POLAR CONTACTS)	E-5160
DETAILS OF MODEL "DP-14" FOUR AND SIX POINT POLARIZED RELAY (FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS)	E-5161

UNION SWITCH & SIGNAL CO.



B



A

Height 9¼", Width 12⅝", Depth 6⅝"

STYLE "DX-13" D. C. INTERLOCKING RELAY

Unless otherwise specified Relays will be furnished with silver-to-graphite front and silver-to-silver back contacts. (Low Voltage contacts).

If high voltage contacts are required, orders should so specify.

Shock absorber springs are furnished on all shelf type Relays.

The maximum contact combination is four front and four back non-independent contacts for each pair of magnets.

For detail description of the Style "DX-13" Relay, see Bulletin 135.

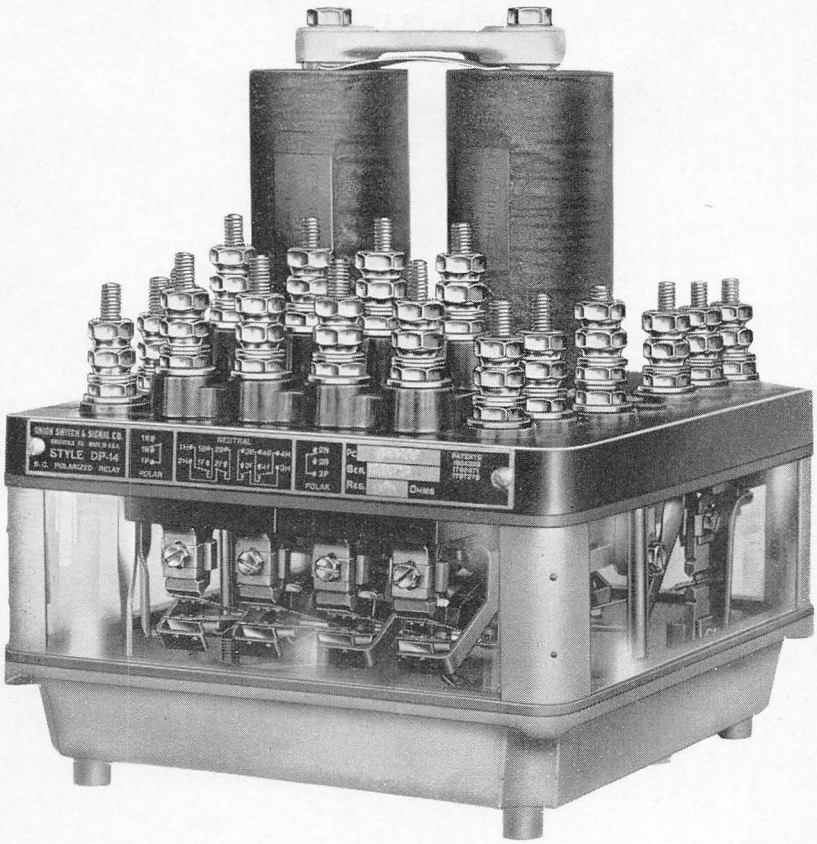
Style "DX-13" D. C. Interlocking Relay

Orders should specify the resistance to which each pair of magnets is to be wound.

For details refer to Plate E-5150.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "DX-13" (Shelf Type) D. C. Interlocking Relay Magnets.....Ohms per Pair,** complete, with four front and four back low voltage contacts, for each pair of magnets.....	C–9242–3
	Aa	**Style "DX-13" (Shelf Type) D.C. Interlocking Relay Magnets.....Ohms per Pair,** complete, with four front and four back low voltage contacts, for each pair of magnets (one front contact on each side arranged for Automatic Flagman).....	C–9242–3
	Ab	**Style "DX-13" (Shelf Type) D.C. Interlocking Relay Magnets.....Ohms per Pair,** complete, with four front and four back low voltage contacts, for each pair of magnets (two front contacts on each side arranged for Automatic Flagman).....	C–9242–3
	B	**Style "DX-13" (Wall Type) D.C. Interlocking Relay Magnets.....Ohms per Pair,** complete, with four front and four back low voltage contacts, for each pair of magnets.....	C–9242–3
	Ba	**Style "DX-13" (Wall Type) D.C. Interlocking Relay Magnets.....Ohms per Pair,** complete, with four front and four back low voltage contacts, for each pair of magnets (one front contact on each side arranged for Automatic Flagman).....	C–9242–3
	Bb	**Style "DX-13" (Wall Type) D.C. Interlocking Relay Magnets.....Ohms per Pair,** complete, with four front and four back low voltage contacts, for each pair of magnets (two front contacts on each side arranged for Automatic Flagman).....	C–9242–3



C

Height 8 15/16", Width 7 3/8", Depth 7 3/4"

Style "DP-14" Four Point Polarized Relay

(With Two Normal and Two Reverse Polar Contacts)

Unless otherwise specified Relays will be furnished with silver to silver impregnated carbon front and silver to silver back neutral and silver to silver impregnated carbon polar contacts. (Low voltage contacts).

If high voltage neutral contacts, or slow or quick release feature are required, orders should so specify.

The maximum contact combination is four front and four back dependent neutral and two normal and two reverse dependent polar contacts.

Style "DP-14" Four Point Polarized Relay

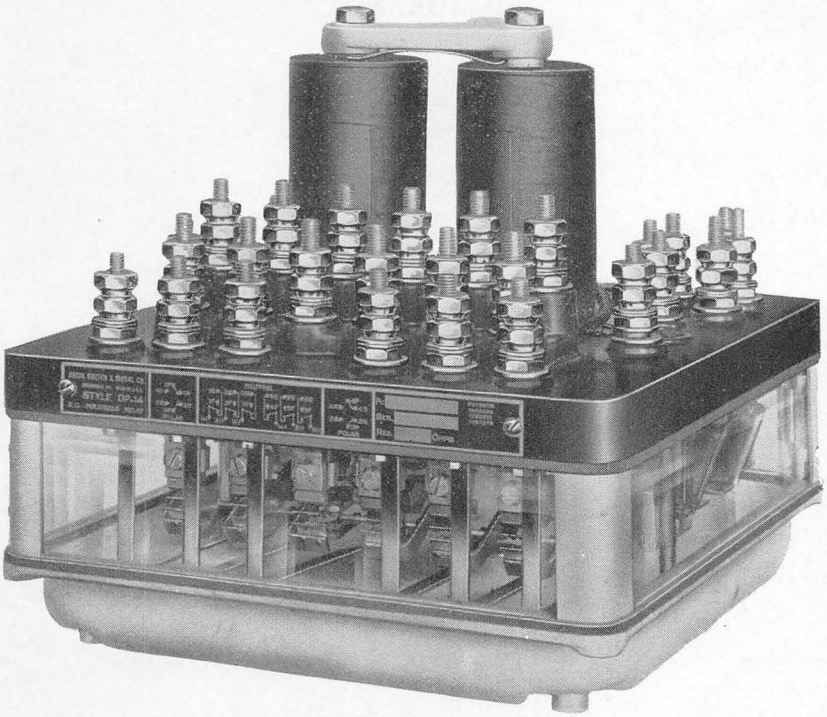
(Two Normal and Two Reverse Polar Contacts)

For details refer to Plate E-5160.

Wall or Shelf Type Shock Absorber Bases (Refs. 100 and 101 of Plate E-5160) are furnished when called for.
Orders should specify type of coils and resistance per pair and whether ordinary or slow release (See Ref. 8 of Plate E-5025).

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "DP-14" Polarized Relay, Coils.....Ohms per Pair				
Piece	Ref.	Neutral Contacts	Polar Contacts	Drawing Reference
	C	4F-4B L.V.	2N-2R	C–9270–4
	Ca	4F-2B L.V.	2N-2R	C–9270–4
	Cb	4F-4B L.V.	2N-2R (With Polar Contacts for Polar Cut Section)	C–9270–4
	Cc	4F-2B L.V.	2N-2R (With Polar Contacts for Polar Cut Section)	C–9270–4



C

Height 8⅝″, Width 9″, Depth 9″

Style "DP-14" Four and Six Point Polarized Relays

(With Four Normal and Four Reverse Polar Contacts)

Unless otherwise specified Relays will be furnished with silver to silver impregnated carbon front and silver to silver back neutral and silver to silver impregnated carbon polar contacts. (Low voltage contacts).

If high voltage neutral contacts, or slow or quick release feature are required, orders should so specify.

The maximum contact combination is six front and six back dependent neutral and four normal and four reverse dependent polar contacts.

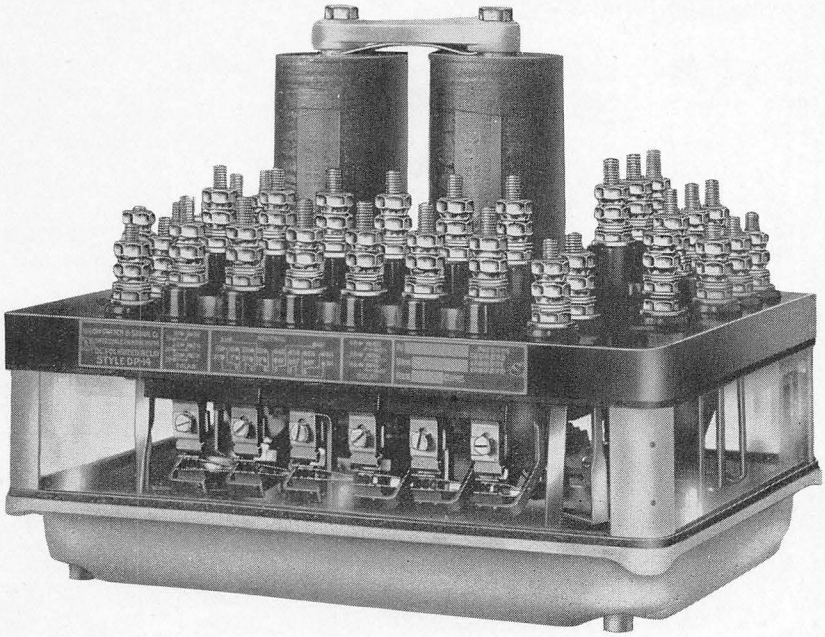
Style "DP-14" Four and Six Point Polarized Relays

(Four Normal and Four Reverse Polar Contacts)

For details refer to Plate E-5161.
Wall or Shelf Type Shock Absorber Bases (Refs. 93 and 94 of Plate E-5161) are furnished when called for.
Orders should specify type of coils and resistance per pair and whether ordinary or slow release (See Ref. 8 of Plate E-5025).
Plug Couplers for Relays will be found on Plate E-5035-5, and if desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "DP-14" Polarized Relay, Coils.....Ohms per Pair				
Piece	Ref.	Neutral Contacts	Polar Contacts	Drawing Reference
	C	4F-2B L.V.	4N-4R	C–9270–6
	Ca	4F-4B L.V.	4N-4R	C–9270–6
	Cb	6F-2B L.V.	4N-4R	C–9270–6
	Cc	6F-4B L.V.	4N-4R	C–9270–6
	Cd	6F-6B L.V.	4N-4R	C–9270–6



A

Height 8¾″, Width 11″, Depth 8″

Style "DP-14" Four and Six Point Polarized Relays

(With Six Normal and Six Reverse Polar Contacts)

Unless otherwise specified Relays will be furnished with silver to silver impregnated carbon front and silver to silver back neutral and silver to silver impregnated carbon polar contacts. (Low voltage contacts).

If high voltage neutral contacts, or slow or quick release feature are required, orders should so specify.

The maximum contact combination is six front and six back dependent neutral and six normal and six reverse dependent polar contacts.

Style "DP-14" Four and Six Point Polarized Relays

(Six Normal and Six Reverse Polar Contacts)

For details refer to Plate E-5162.
Wall or Shelf Type Shock Absorber Bases (Refs. 85 and 86 of Plate E-5162) are furnished when called for.
Orders should specify type of coils and resistance per pair and whether ordinary or slow release (See Ref. 8 of Plate E-5025).

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "DP-14" Polarized Relay, Coils.....Ohms per Pair				
Piece	Ref.	Neutral Contacts	Polar Contacts	Drawing Reference
	A	4F-4B L.V.	6N-6R	C–9270–9
	Aa	6F-4B L.V.	6N-6R	C–9270–9
	Ab	6F-6B L.V.	6N-6R	C–9270–9

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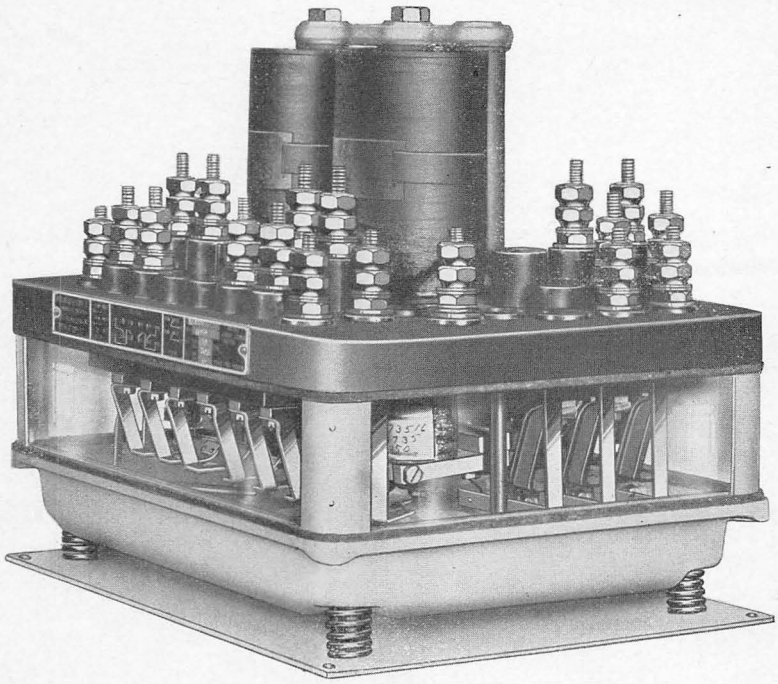

Width 11″, Depth 8″, Height 9½″, including shock absorber

STYLE "DP-17" POLARIZED RELAY
With Four Normal and Four Reverse Polar Contacts

The Style "DP-17" polarized relay has the same polar magnetic structure as the "DP-14" relays Plates E-5110 and E-5111. The neutral structure is also the same, except that a pair of small neutralizing coils are carried on extended pole pieces to provide means for permitting the neutral armature to pick up when the polar contacts agree in position with the polarity of the controlling circuit.

The windings provided for the 12 volt relay are suitable for a range of battery bus voltage of from 11 to 20 volts; but owing to special characteristics, there are varying limits to the permissible difference between the volts across the neutralizing and the main operating coils. Special windings can be provided for other voltages.

The Style "DP-17" relay is designed for use wherever it is desired to check that the polar armature agrees in position with the polarity of the controlling circuit, before permitting the neutral armature to pick up.

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FOUR POINT STYLE "DP-17" POLARIZED RELAYS, FOUR NORMAL AND FOUR REVERSE POLAR CONTACTS

Orders should specify the voltage at which relay is to operate

For details refer to Plate E-5165

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "DP-17" Polarized Relay (Including Shelf Type Shock Absorber Base, as shown)**, with four front and four back low voltage non-independent neutral contacts and four normal and four reverse polar contacts.....	C–9363–1
	Aa	**Style "DP-17" Polarized Relay (Including Wall Type Shock Absorber Base Ref. 103, Plate E-5165)**, with four front and four back low voltage non-independent neutral contacts and four normal and four reverse polar contacts.....	C–9363–1

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MEMORANDA

Remove Staple Before Filing Plates
in Proper Sequence in Looseleaf Covers

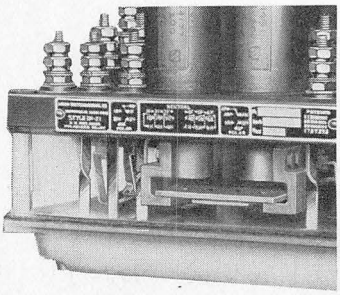
Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

The structural details of the Styles "DP-20" and "DP-21" relays are patterned after those of the Style "DP-14" relay, with the addition of a pair of retaining coils and an auxiliary armature which is carried on a rigid extension arm attached to the main neutral armature. The "DP-20" and "DP-21" relays may be used in any circuit in which the contacts of the neutral armature must remain closed during ordinary periods required to polechange the relay circuit. The retained neutral feature permits this relay to be used without a slow release repeater, thus saving the energy for the repeater. The relay takes even less current than the efficient "DP-14" relay of the same resistance so that it is especially suitable for service as a track relay.

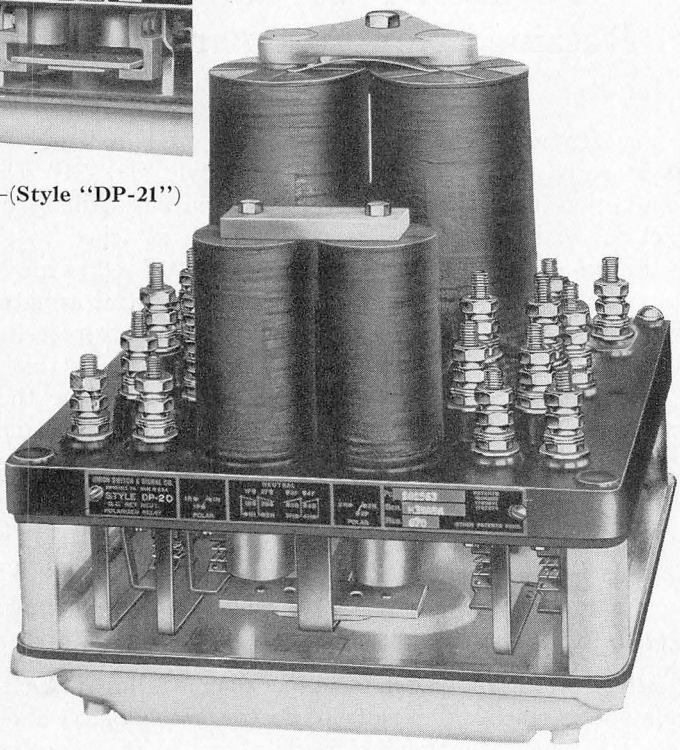
The distinction in design between the "DP-20" and "DP-21" relays is that the latter has auxiliary pole pieces per View "Z" which extend under the auxiliary armature to provide slow pick-up operation of the neutral armature.

All parts are arranged in a manner to give full A.A.R. clearances, while not sacrificing simplicity of design or the logical and systematic arrangement of terminal posts characteristic of other Union Relays.

The top plate is of the usual brown bakelite construction and carries the standard A.A.R. name plate, clearly showing the arrangement of contacts as well as other data.



View "Z"—(Style "DP-21")



Style "DP-20"

Four Point, Height $9\frac{13}{16}$", Width 9", Depth 9"
Six Point, Height $9\frac{13}{16}$", Width 10", Depth 9"

Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

See preceding page for description.

Four and Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

For details of 4 and 6-Point Relays of original design (recognizable by their use of cap screws in the main cores) refer to Plates E-5166 and E-5167. Details for the original "DP-21" Relays are the same as the details for the original "DP-20" Relays with the addition of the Hold Down Pole Pieces detailed on Plate E-5169.
For details of 4 and 6-Point Relays of present design as shown on opposite page (without cap screws in main cores) refer to Plates E-5168 and E-5169.
Shock Absorber Bases (Ref. 26 of Plate E-5168 and Ref. 109 of Plate E-5169) or Wall Mounting Brackets (Ref. 27 of Plate E-5168 and Ref. 110 of Plate E-5169) are not furnished unless called for.
Orders should specify resistance per pair of Coils (See Refs. 19 and 20, Plate E-5025.)
Special problems of application should be taken up with our District Offices.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY, MAIN MAGNET COILS.....—OHMS PER PAIR

Piece	Ref.	Neutral Contacts	Polar Contacts	Drawing Reference
	Ab	4F-4B L.V.	2N-2R.....	C–9407–5
	Ac	4F-4B L.V.	4N-4R.....	C–9407–5
	Ad	4F-4B L.V.	2N-2R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–5
	Ae	4F-4B L.V.	4N-4R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–5
	Bf	6F-6B L.V.	4N-4R.....	C–9407–3
	Bg	6F-4B L.V.	4N-4R.....	C–9407–3
	Bh	6F-6B L.V.	4N-4R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–3
	Bj	6F-4B L.V.	4N-4R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–3

Four and Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

(Continued)

For details of 4 and 6-Point Relays of original design (recognizable by their use of cap screws in the main cores) refer to Plates E-5166 and E-5167.
Details for the original "DP-21" Relays are the same as the details for the original "DP-20" Relays with the addition of the Hold Down Pole Pieces detailed on Plate E-5169.
For details of 4 and 6-Point Relays of present design as shown on opposite page (without cap screws in main cores) refer to Plates E-5168 and E-5169.
Shock Absorber Bases (Ref. 26 of Plate E-5168 and Ref. 109 of Plate E-5169) or Wall Mounting Brackets (Ref. 27 of Plate E-5168 and Ref. 110 of Plate E-5169) are not furnished unless called for.
Orders should specify resistance per pair of Coils (See Refs. 19 and 20, Plate E-5025.)
Special problems of application should be taken up with our District Offices.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

STYLE "DP-21" RETAINED NEUTRAL POLARIZED (SLOW PICK-UP) RELAY PER VIEW "Z", MAIN MAGNET COILS.....—OHMS PER PAIR

Piece	Ref.	Neutral Contacts	Polar Contacts	Drawing Reference
	C	4F-4B L.V.	2N-2R.....	C–9407–7
	Ca	4F-4B L.V.	4N-4R.....	C–9407–7
	Cb	4F-4B L.V.	2N-2R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–7
	Cc	4F-4B L.V.	4N-4R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–7
	D	6F-6B L.V.	4N-4R.....	C–9407–9
	Da	6F-4B L.V.	4N-4R.....	C–9407–9
	Db	6F-6B L.V.	4N-4R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–9
	Dc	6F-4B L.V.	4N-4R (Track Relay with Polar Contacts for Polar Cut Section).....	C–9407–9

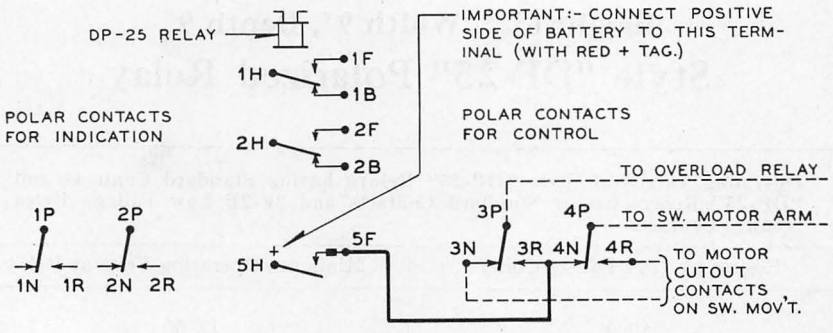
REMOVE STAPLE AND FILE IN PROPER SEQUENCE.

Style "DP-25" Polarized Relay

The Style "DP-25" Polarized Relay is designed specifically to provide a universal D.C. control device for low voltage D.C. (first range) electric switch movements, or for 110 volt D.C. or A.C. (except 100 cycle) movements.

The construction details of the "DP-25" relay are very similar to those of our well known "DP-14" polarized D.C. relay, Plate E-5111. However, many special features have been incorporated in its design that make it particularly suitable for switch control service. The relay is designed to operate on low voltage D.C. control energy, but can be operated by high voltage D.C. control where the circuits of existing plants require it.

The Style "DP-25" Relay is available in two contact capacities. The standard assembly includes one heavy duty magnetic blowout neutral contact and 4N-4R polar contacts. The other assembly is the same except that two extra front and back dependent L.V. neutral contacts are included. The minimum operating values shown in the table under Plate E-5123 apply to both assemblies.



The permanent inter-connection of the polar and neutral contacts used for motor control simplifies the application of the relay in service as illustrated above.

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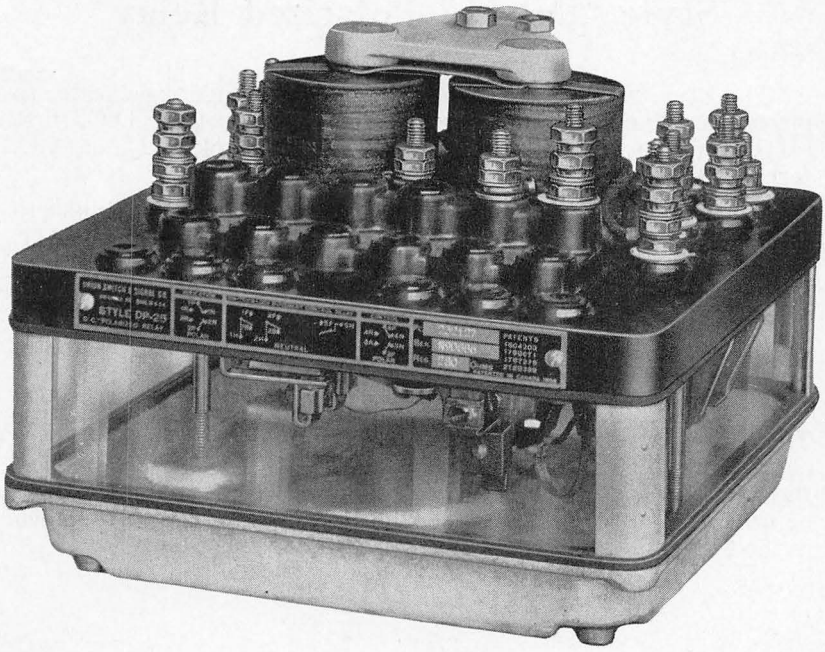

Height $6\frac{13}{16}''$, Width $9''$, Depth $9''$

Style "DP-25" Polarized Relay

Operating Values of Style "DP-25" Relays having Standard Contacts and "DP-25" Relays having Standard Contacts and 2F-2B Low Voltage Extra Neutral Contacts.

Resistance (Per Pair of Coils)	Minimum Operating Volts at Relay
1000	12.00
700	10.00
450	7.65
280	6.02
110	3.80

In application, allowance must be made for line resistance, series relays if such are used, and increased resistance under high temperature conditions. The relay will not be damaged by over-energization.

Style "DP-25" Polarized Relay

Details will be found on the following Plates: "DP-25" having no extra neutral contacts Plate E-5172; "DP-25" having two extra neutral contacts Plate E-5173.

Shelf Type Shock Absorber Base (Ref. 101 Plate E-5172) or Wall Type Shock Absorber Base (Ref. 102 Plate E-5172) is not furnished unless called for.

Plug Couplers will be found on Plate E-5035-7.

Junction Box for housing Style "DP-25" Relay will be found on Plate C-2771.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
		Note: The standard arrangement of contacts is 1F (MHD)*-OB Neutral and 4N-4R Polar.	
	A	**Style "DP-25" Polarized Relay with standard contacts and Coils -Ohms per pair.** (Orders should specify resistance per pair of coils).....	C–9270–32
	Aa	**Style "DP-25" Polarized Relay with standard contacts and 2F-2B low voltage extra neutral contacts and Coils -Ohms per pair.** (Orders should specify resistance per pair of coils).....	C–9270–32
		*1F(MHD) signifies 1 Front Magnetic Heavy Duty.	

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MEMORANDA

File Plate in Proper Sequence in Loose Leaf Cover

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PLATE E-5140

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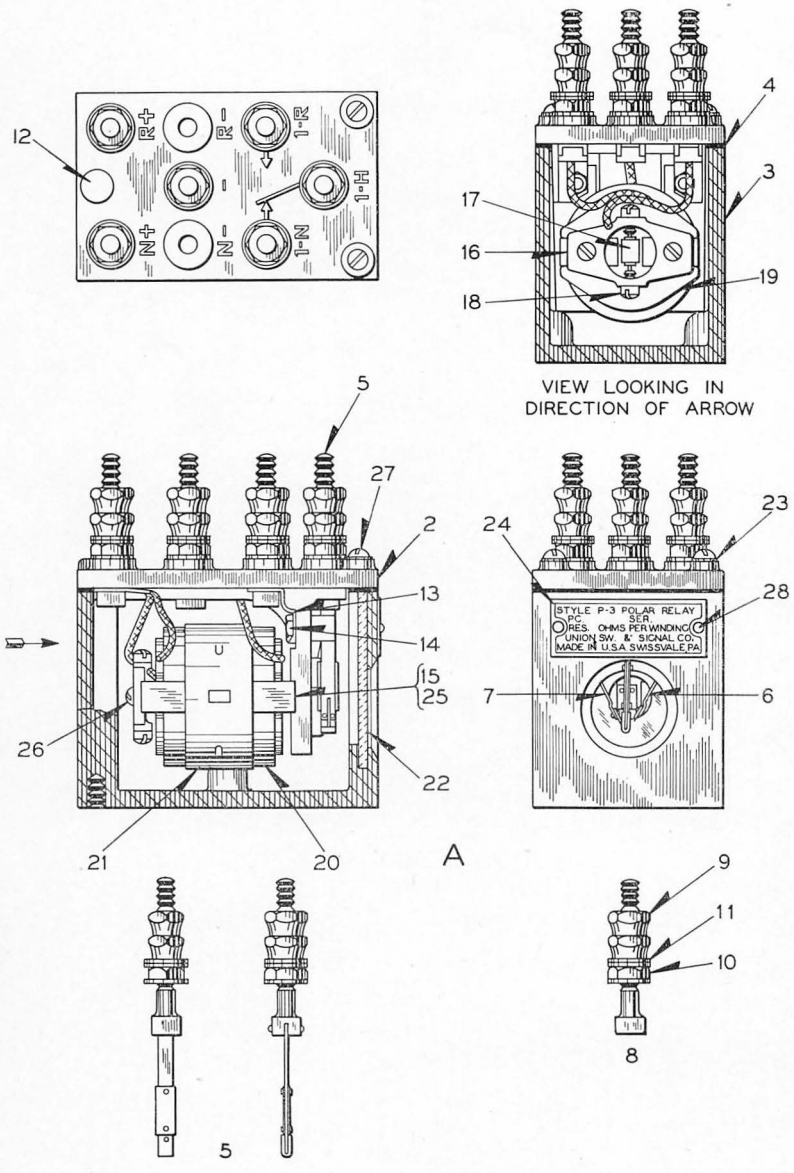

STYLE "P-3" POLAR RELAY

UNION SWITCH & SIGNAL CO.

STYLE "P-3" POLAR RELAY

For application to Model 14 E. P. Interlocking Machines refer to Plate A-2028

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
178517	**A**	**Style "P-3" Polar Relay,** 225-ohms per winding	B–12647–3
198643	**Aa**	**Style "P-3" Polar Relay,** 375-ohms per winding	B–12647–3
183419	**Ab**	**Style "P-3" Polar Relay,** 225-ohms per winding (With Name Plate Assembled Upside Down) for applying to Model 14 E. P. Interlocking Machines	B–12647–3
187213	**Ac**	**Style "P-3" Polar Relay,** 375-ohms per winding (With Name Plate Assembled Upside Down) for applying to Model 14 E. P. Interlocking Machines	B–12647–3
178079	**2**	**Top Plate**	B–12705–2
178515	**3**	Case	B–12705–1
178323	**4**	**Gasket,** used between Refs. 2 and 3	8078–1536
	5	**Contact Spring and Terminal Post** with Rivet, Nuts, and Washers (Inc. 1-5a, 2-9, 1-10 and 3-11)	12451–
178319	**5a**	**Contact Spring and Terminal Post** with Rivet (without Nuts and Washers) for Ref. 5	8385–2316
178443	**6**	**Contact Spring (R. H.),** with Terminal Post and Rivet	8385–2315
178363	**7**	**Contact Spring (L. H.),** with Terminal Post and Rivet	8385–2315
	8	**Terminal Post** with Nuts and Washers (Inc. 1-8a, 2-9, 1-10 and 3-11)	12451–
160475	**8a**	**Terminal Post Only,** for Ref. 8	8094–2207
29101	**9**	**Nut**	8109–193
29103	**10**	**Nut**	8109–194
29102	**11**	**Washer**	7828–139

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STYLE "P-3" POLAR RELAY
(Continued)

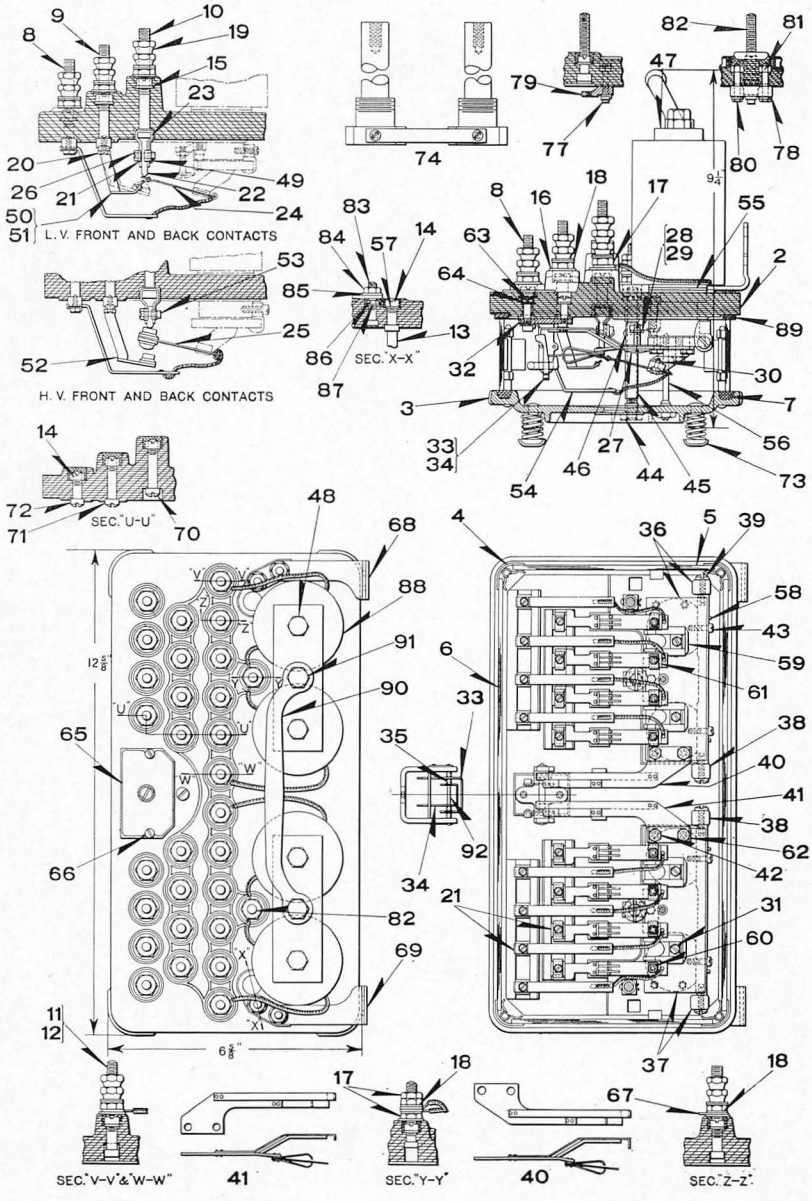
For application to Model 14 E. P. Interlocking Machines refer to Plate A-2028

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
178306	**12**	**Screw**	8098–1089
178499	**13**	**Terminal Connector**	8244–148
29956	**14**	**Nut**	8109–202
148190	**15**	**Pole Piece**	8250–79
148191	**16**	**Armature Support**	8303–102
178305	**17**	**Armature Complete,** with Pivot and Pins	8157–398
148181	**18**	**Set Screw**	8378–350
178362	**19**	**Coil** with Leads (225 ohms per winding)	8133–417
187212	**19a**	**Coil** with Leads (375 ohms per winding)	8133–417
148189	**20**	**Permanent Magnet**	12586–6
148311	**21**	**Magnet Holder**	11893–396
178361	**22**	**Glass Shield**	8163–212
17376	**23**	**Washer**	7828–66
178360	**24**	**Name Plate**	8225–413
	25	**Machine Screw No. 8-36x$\frac{7}{16}$″** Flat Hd. S. (Tin Pl.) (For attaching Pole Piece to Top Plate)	
	26	**Machine Screw No. 8-36x$\frac{1}{4}$″** Rd. Hd. S. (Tin Pl.)	
	27	**Machine Screw No. 8-36x$\frac{3}{4}$″** Rd. Hd. Br. (N. P.)	
	28	**Screw, No. 4x$\frac{1}{4}$″** Rd. Hd. Hardened	

PLATE E-5150

UNION SWITCH & SIGNAL CO.



DETAILS OF STYLE "DX-13" D. C. INTERLOCKING RELAY

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DX-13" D. C. INTERLOCKING RELAY

For Complete Relays Refer to Plate E-5100.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	2	**Top Plate,** without Cores	C–9243
154876	3	**Base** with Glass Supports, Glass Shields and Gasket (Inc. 1-3a, 4-4, 2-5, 2-6 and 1-7)	C–9243–2
154875	3a	**Base only,** for Ref. 3	C–9243–2
142653	4	**Glass Support**	10932–29
142646	5	**Glass Shield** (End)	8163–294
154824	6	**Glass Shield** (Side)	8163–294
156796	7	**Gasket**	8078–771
	8	**Terminal Post** with Nuts, Washers and Screw, for connector (Inc. 1-8a, 1-16, 1-17, 2-18, 2-19, 1-20, 1-21, 1-14 and 1-15)	12451
131234	8a	**Terminal Post only,** for Ref. 8	8094–2125
	9	**Terminal Post** with Nuts, Washers and Screw for Back Contact (Inc. 1-9a, 1-16, 1-17, 2-18, 2-19, 1-20, 1-21, 1-14 and 1-15)	12451
142631	9a	**Terminal Post only,** for Ref. 9	8094–2125
	10	**Terminal Post** with Nuts and Washers for Front Contact (Inc. 1-10a, 1-16, 1-17, 2-18, 3-19, 1-14 and 1-15)	12451
131237	10a	**Terminal Post only,** for Ref. 10	8094–1192
	11	**Terminal Post** with Nuts and Washers for Magnet Lead (used in Section "W-W") (Inc. 1-11a, 1-16, 1-17, 2-18, 2-19, 1-14 and 1-15)	12451
112417	11a	**Terminal Post only,** for Ref. 11	8094–1192

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DETAILS OF STYLE "DX-13" D. C. INTERLOCKING RELAY (Continued)

For Complete Relays Refer to Plate E-5100.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	12	**Terminal Post** with Nuts and Washers for Magnet Lead (used in Section "V-V") (Inc. 1-12a, 1-16, 1-17, 2-18, 2-19, 1-14 and 1-15)	12451
130200	12a	**Terminal Post only,** for Ref. 12	8094–1192
	13	**Center Post** with Bushing, Pin, Washer and Nuts (Inc. 1-13a, 1-14, 1-57, 1-45, 1-46 and 1-44)	12471
142644	13a	**Center Post only,** for Ref. 13	8098–1299
72948	14	**Nut**	8109–383
70539	15	**Washer**	8274–73
69705	16	**Washer**	7828–287
29103	17	**Nut**	8109–194
29102	18	**Washer**	7828–139
29101	19	**Nut**	8109–193
131239	20	**Screw**	8098–845
134516	21	**Lock Washer**	8486–368
131247	22	**Graphite Contact Tip** (For low voltage contacts)	8341–325
131245	23	**Front Terminal Post**	8094–2122
150268	24	**Contact Spring** (Without Connector) Low Voltage Front and Back	8385–1996
140833	24a	**Contact Spring** (Without Connector) Low Voltage Front and Back, for Automatic Flagman	8385–1996
145159	25	**Contact Spring** (Without Connector) High Voltage Front and Back	8385–2098
145310	25a	**Contact Spring** (Without Connector) High Voltage Front only	8385–2099

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DETAILS OF STYLE "DX-13" D. C. INTERLOCKING RELAY (Continued)

For Complete Relays Refer to Plate E-5100.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
57996	**26**	**Adjusting Screw**	8098–845
149076	**27**	**Back Stop Screw**	8098–549
1506	**28**	**Nut** for Ref. 27	8109–12
149339	**29**	**Lock Washer** for Ref. 28	8486–368
151836	**30**	**Nut**	8109–445
142673	**31**	**Screw**	8098–1300
410199	**32**	**Bearing**	410199
410202	**33**	**Locking Dog**	410202
410203	**34**	**Locking Dog**	410202
410208	**35**	**Separator**	410208
155401	**36**	**R. H. Armature** with Bracket and Trunnions (Inc. 1-36a, 1-38 and 2-39)	C–9243–3
155049	**36a**	**Armature only** for Ref. 36	8157–359
156324	**37**	**L. H. Armature** with Bracket and Trunnions (Inc. 1-37a, 1-38 and 2-39)	C–9243–3
156305	**37a**	**Armature only** for Ref. 37	8157–359
142639	**38**	**Bracket** for Refs. 36 and 37	8303–100
47579	**39**	**Trunnion** for Refs. 36 and 37	8378–197
155122	**40**	**R. H. Locking Arm** with Locking Springs	11893–452
155123	**41**	**L. H. Locking Arm** with Locking Springs	11893–452
140851	**42**	**Screw**	8098–1294

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DX-13" D. C. INTERLOCKING RELAY (Continued)

For Complete Relays Refer to Plate E-5100.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	43	**Machine Screw No. 8-36x½″** Fil. Hd. Br.	
138218	44	**Nut** for Ref. 13	8265–252
142632	45	**Bushing** for Ref. 13	8095–631
61151	46	**Pin** for fastening Ref. 45 to Ref. 13	8097–837
155895	47	**Back Strap**	8162–221
	48	**Cap Screw** $\frac{5}{16}$″**-18x¾″** Hex. Hd.	
134400	49	**Nut Lock**	8486–371
131261	50	**L. H. Back Post** (Low Voltage)	8094–2123
131262	51	**R. H. Back Post** (Low Voltage)	8094–2123
145164	52	**L. H. Back Post** (High Voltage)	8094–2190
145165	52a	**R. H. Back Post** (High Voltage)	8094–2190
131264	53	**Adjusting Nut**	8109–428
142643	54	**Connector**	8064–631
138576	55	**Washer**	8078–1042
159836	56	**Screw** with Nut Ref. 56b (Used when shipping)	8098–918
137935	56a	**Screw** (Used in place of Ref. 56 when installed)	8098–1289
537	56b	**Nut** for Ref. 56	8109–1
73772	57	**Washer**	7826–180
57497	58	**Dowel**	8097–872
150113	59	**Contact Spring Support**	9968–849

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DX-13" D. C. INTERLOCKING RELAY (Continued)

For Complete Relays Refer to Plate E-5100.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
150166	**60**	**Screw**	8098–550
150140	**61**	**Lock Washer**	8486–367
410035	**62**	**Nut Lock.**	
155421	**63**	**Screw**	8098–248
44999	**64**	**Washer** for Ref. 63	7828–206
155476	**65**	**Name Plate**	8225–333
	66	**Screw No. 6x3/8″** for fastening Ref. 65 to Top Plate.	
142777	**67**	**Tag** (Marked Flagman)	8988–75
148973	**68**	**L. H. Wall Bracket**	11893–404
148974	**69**	**R. H. Wall Bracket**	11893–404
	70	**Machine Screw No. 14-24x1¼″** with Nut Ref. 14.	
145417	**71**	**Dummy Post** with Nut Ref. 14	8098–589
32680	**72**	**Dummy Post** with Nut Ref. 14	8098–589
410218	**73**	**Shock Absorber Spring.**	
156897	**74**	**Magnet Cores**	C–9078–6
131210	**75**	**Nut** for Ref. 74 (Not shown)	8109–426
74816	**76**	**Washer** for Ref. 75 (Not shown)	8274–97
149075	**77**	**Core Pin**	8114–677
150458	**78**	**Lock Washer**	8486–382
149254	**79**	**Core Pin Bracket**	C–9078–5

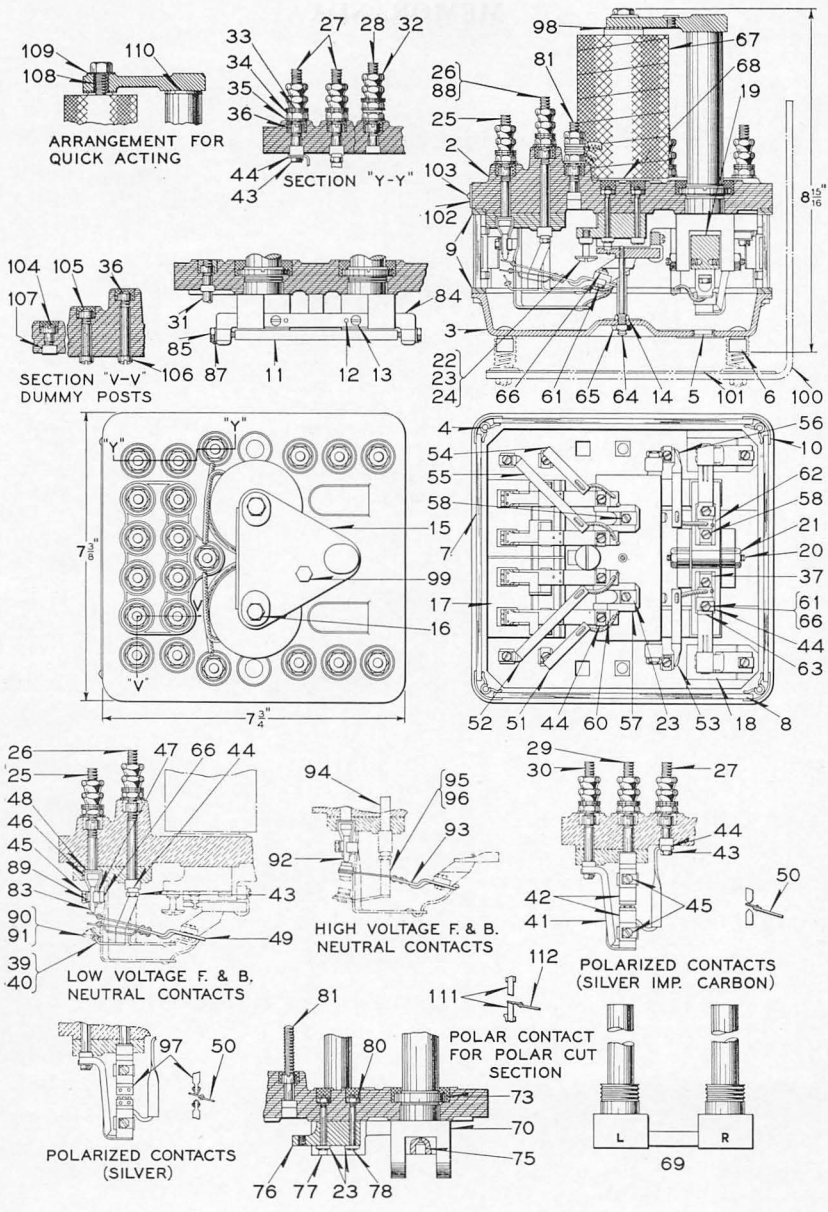
UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DX-13" D. C. INTERLOCKING RELAY (Continued)

For Complete Relays Refer to Plate E-5100.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	80	**Screw** with Nut Ref. 81	12471
149114	**80a**	**Screw only,** for Ref. 80	8098–1300
28166	**81**	**Nut,** for Ref. 80	8109–192
	82	**Terminal Post** with Nuts and Washers for Magnet Lead (Inc. 1-82a, 1-16, 3-17, 2-18, 1-14 and 1-15)	12471
122782	**82a**	**Terminal Post only,** for Ref. 82	8094–1192
	83	**Terminal Post** with Nuts, Washer and Lock Washer for Wall Brackets, (Inc. 1-83a, 1-84, 1-85, 1-86 and 1-87)	12471
149152	**83a**	**Terminal Post only,** for Ref. 83	8094–2205
26942	**84**	**Nut** for Ref. 83	8109–184
	85	$\frac{7}{16}$" **Plain S. Lock Washer** ($\frac{3}{32}$"x$\frac{1}{32}$") for Ref. 83.	
9145	**86**	**Nut** for Ref. 83	8109–72
73129	**87**	**Washer** for Ref. 83	7826–180
	88	**Magnet Coil Complete** with Leads and Terminals (For details refer to Plate E-5025)	8133
154823	**89**	**Gasket** for Ref. 2	8078–1459
159988	**90**	**Handle**	8311–90
	91	**Cap Screw** $\frac{5}{16}$"-18x$\frac{1}{2}$" Hex. Hd. for fastening Handle to Back Strap.	
410211	**92**	**Pin** for Locking Dogs	410210



Details of Style "DP-14" Polarized Relay

(Four Front and Four Back Neutral and Two Normal and Two Reverse Polar Contacts)

Details of Style "DP-14" Polarized Relay

(Four Front and Four Back Neutral and Two Normal and Two Reverse Polar Contacts)

For complete Relays Refer to Plate E-5110.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
157220	**2**	**Top Plate** without Cores	C–9271–1
157223	**3**	**Base Plate with Supports, Posts, Gasket, Ventilator and Glass Shields** (Inc. 1-3a, 4-4, 1-5, 4-6, 2-7, 2-8, 1-9 and 4-10)	C–9271–2
157221	**3a**	**Base Plate Only**	C–9271–2
157224	**4**	**Corner Post**	8114–632
34340	**5**	**Ventilator**	C–7459–6
215584	**6**	**Stud**	8114–631
157226	**7**	**Glass Shield (End)**	8163–294
157225	**8**	**Glass Shield (Side)**	8163–294
157242	**9**	**Gasket**	8078–1472
142653	**10**	**Shield Support**	10932–29
157244	**11**	**Armature with Bracket and Pivot Screws** (Inc. 1-11a, 1-84, 2-85 and 2-87)	C–9271–3
157246	**11a**	**Armature Only** for Ref. 11	8157–366
57497	**12**	**Pin**	8097–872
	13	**Machine Screw,** No. 8-36x½″ Fil. Hd. Br. (N.P.)	
138218	**14**	**Nut** for Center Post Ref. 31	8265–252
157855	**15**	**Back Strap**	8162–231
	16	**Cap Screw,** $\frac{5}{16}$″-18x¾″ Hex. Hd. S. (Cad. Pl.)	
157218	**17**	**Insulation Block**	8750–2348
157217	**18**	**Insulation Block**	8750–2347
157852	**19**	**Polar Armature**	8157–367
157854	**20**	**Trunnion Screw**	8378–353
26545	**21**	**Nut**	8109–181

Details of Style "DP-14" Polarized Relay

(Four Front and Four Back Neutral and Two Normal and Two Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
149076	**22**	**Stop Screw**	8098–549
149339	**23**	**Lock Washer**	8486–368
1506	**24**	**Nut**	8109–12
148207	**25**	**Terminal Post with Nuts and Washers** (Inc. 1-25a, 2-32, 2-33, 1-34, 1-35 and 1-36)	12451–241
131237	**25a**	**Terminal Post Only,** for Ref. 25	8094–1192
170895	**26**	**Terminal Post with Nuts and Washers** (Inc. 1-26a, 2-32, 2-33, 1-34, 1-35, 1-36, 1-43 and 1-44)	12451–239
157863	**26a**	**Terminal Post Only,** for Ref. 26	8094–2125
170896	**27**	**Terminal Post with Nuts and Washers** (Inc. 1-27a, 2-32, 2-33, 1-34, 1-35, 1-36, 1-43 and 1-44)	12451–239
158035	**27a**	**Terminal Post Only,** for Ref. 27	8094–2125
	28	**Terminal Post with Nuts and Washers** (Inc. 1-28a, 2-32, 3-33, 2-34, 1-35 and 1-36)	12451–
130200	**28a**	**Terminal Post Only,** for Ref. 28	8094–1192
170911	**29**	**Terminal Post with Nuts and Washers** (Inc. 1-29a, 2-32, 2-33, 1-34, 1-35 and 1-36)	12451–241
112417	**29a**	**Terminal Post Only,** for Ref. 29	8094–1192
170910	**30**	**Terminal Post with Nuts and Washers** (Inc. 1-30a, 2-32, 2-33, 1-34, 1-35, 1-36, 1-43 and 1-44)	12451–239
157858	**30a**	**Terminal Post Only,** for Ref. 30	8094–2235
158034	**31**	**Center Post**	8098–876
29101	**32**	**Nut**	8109–193
29102	**33**	**Washer**	7828–139
29103	**34**	**Nut**	8109–194
69705	**35**	**Washer**	7828–287
72948	**36**	**Nut**	8109–383

Details of Style "DP-14" Polarized Relay

(Four Front and Four Back Neutral and Two Normal and Two Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
155340	**37**	**Lock Washer**	8486–368
163564	**39**	**Back Post, R. H.** (Silver Tip)	8094–2261
163563	**40**	**Back Post, L.H.** (Silver Tip)	8094–2261
157808	**41**	**Contact Post**	8094–2236
158043	**42**	**Contact Tip** (Silver Imp. Carbon)	8341–476
62977	**43**	**Screw**	8098–845
134516	**44**	**Lock Washer**	8486–368
57996	**45**	**Adjusting Screw**	8098–845
131245	**46**	**Front Terminal Post** (Contact Holder)	8094–2122
173737	**47**	**Nut Lock**	8486–403
134400	**48**	**Nut Lock**	8486–371
180284	**49**	**Contact Spring with Flex. Connector** (L.V. Front and Back)	8385–2237
180285	**49a**	**Contact Spring with Flex. Connector** (L.V. Front only)	8385–2239
161414	**50**	**Contact Spring with Flex. Connector** (Polar Contacts)	8385–2336
158139	**51**	**Connector L.H.,** with flexible Connector	8064–674
158138	**51a**	**Connector L.H.,** without flexible Connector	8064–674
158143	**52**	**Connector L.H.,** with flexible Connector	8064–675
158142	**52a**	**Connector L.H.,** without flexible Connector	8064–675
158147	**53**	**Connector L.H.,** with flexible Connector	8064–676
158146	**53a**	**Connector L.H.,** without flexible Connector	8064–676
158141	**54**	**Connector R.H.,** with flexible Connector	8064–674
158140	**54a**	**Connector R.H.,** without flexible Connector	8064–674

Details of Style "DP-14" Polarized Relay

(Four Front and Four Back Neutral and Two Normal and Two Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
158145	**55**	**Connector R.H.,** with flexible Connector	8064–675
158144	**55a**	**Connector R.H.,** without flexible Connector	8064–675
158149	**56**	**Connector R.H.,** with flexible Connector	8064–676
158148	**56a**	**Connector R.H.,** without flexible Connector	8064–676
42252	**56b**	**Flexible Connector Only**	10934–87
150113	**57**	**Contact Spring Support**	9968–849
142673	**58**	**Screw**	8098–1300
150140	**60**	**Lock Washer**	8486–367
150166	**61**	**Screw**	8098–550
141189	**62**	**Contact Spring Support**	9968–702
131258	**63**	**Lock Washer**	8486–367
142642	**64**	**Screw**	8098–1298
537	**65**	**Nut** for Ref. 64	8109–1
151836	**66**	**Nut**	8109–445
	67	**Magnet Coil,** with Leads and Terminals (for dimensions and resistances refer to Plate E-5025)	8133–
168826	**68**	**Washer** ($\frac{1}{16}$″ thick)	8078–1499
	69	**Pair of Cores** (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	8250–83
157235	**70**	**Permanent Magnet Core**	8101–338
104169	**73**	**Nut**	8265–359
157229	**75**	**Core Pin**	8097–973
157231	**76**	**Armature Stop Bracket**	8303–106
157228	**77**	**Stop Pin**	8114–717

Details of Style "DP-14" Polarized Relay

(Four Front and Four Back Neutral and Two Normal and Two Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
157230	**78**	**Screw**	8098–1300
28166	**80**	**Nut**	8109–192
	81	**Terminal Post** with Nuts and Washers for Magnet Leads (Inc. 1-81a, 2-33, 3-34, 1-35 and 1-36)	12451–
115706	**81a**	**Terminal Post Only,** for Ref. 81	8094–1192
168161	**83**	**Contact Tip** (Silver Imp. Carbon)	8341–476
157243	**84**	**Bracket** for Ref. 11	8303–107
159814	**85**	**Pivot Screw**	8378–354
159815	**87**	**Lock Washer**	8486–395
	88	**Terminal Post** with Nut Ref. 36 (Used as dummy post in back contact space when front contact only is used)	12451–
130593	**88a**	**Terminal Post Only**	8094–1192
20686	**89**	**Washer**	7828–108
167457	**90**	**Back Post, L.H.** (Silver Imp. Carbon Tip)	8094–2281
167458	**91**	**Back Post, R.H.** (Silver Imp. Carbon Tip)	8094–2281
168308	**92**	**Contact Tip** (Silver Imp. Carbon)	8341–485
180286	**93**	**Contact Spring** with Flex. Connector (H.V. Front)	8385–2258
180287	**93a**	**Contact Spring** with Flex. Connector (H.V. Back)	8385–2275
180301	**93b**	**Contact Spring** with Flex. Connector (H.V. Front and Back)	8385–2275
	94	**Terminal Post with Nuts and Washers** (Inc. 1-94a, 2-32, 2-33, 1-34, 1-35, 1-36, 1-43 and 1-44)	12451–
170642	**94a**	**Terminal Post Only,** for Ref. 94	8094–2125
170643	**95**	**Back Post, L.H.** (Silver Imp. Carbon Tip)	8094–2288
170644	**96**	**Back Post, R.H.** (Silver Imp. Carbon Tip)	8094–2288

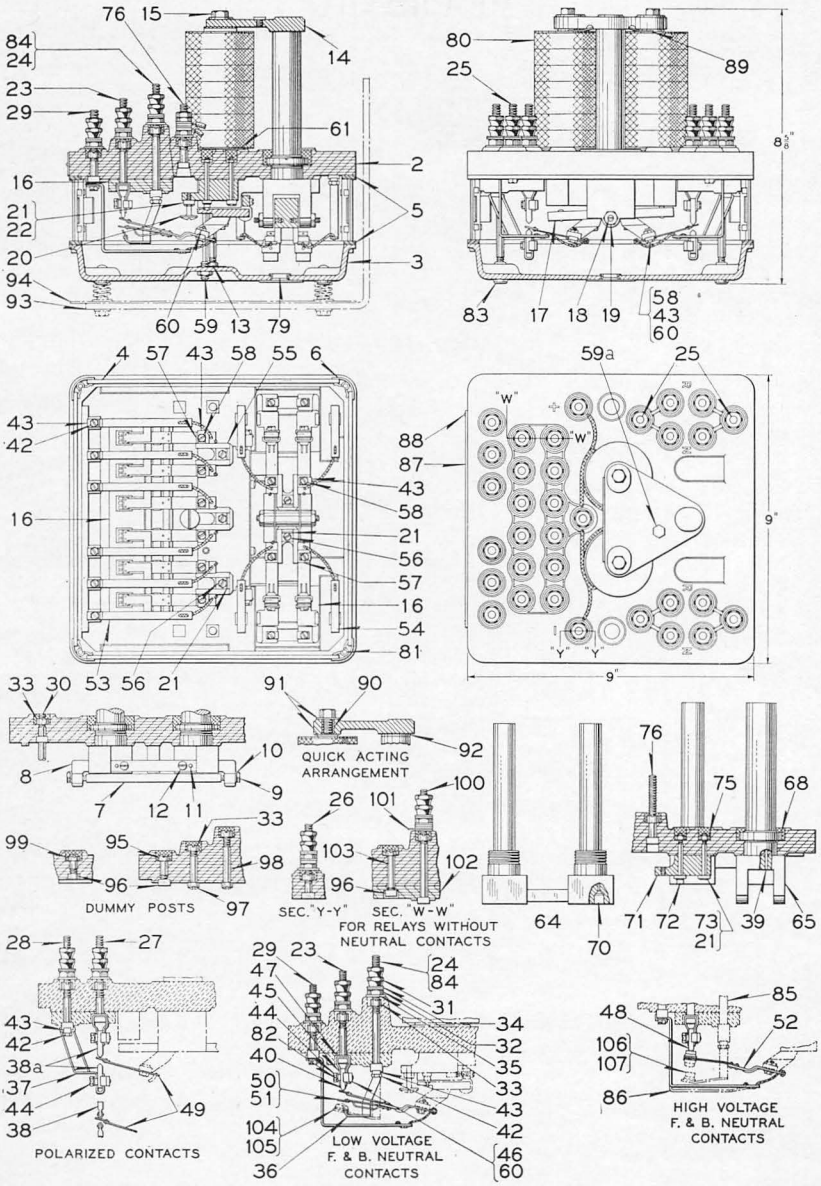
Details of Style "DP-14" Polarized Relay

(Four Front and Four Back Neutral and Two Normal and Two Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
159125	**97**	**Contact Tip** (Silver)	8094–2240
184680	**98**	**Coil Lock**	8735–784
137935	**99**	**Screw**	8098–1289
173297	**100**	**Wall Type Shock Absorber Base** (For details refer to Ref. Fe of Plate E-5030)	12404–28
172594	**101**	**Shelf Type Shock Absorber Base** (For details refer to Ref. Ee of Plate E-5030)	12404–27
180847	**102**	**Name Plate**	8225–421
	103	**Screw,** No. 4-40x$\frac{1}{4}$" Rd. Hd. (Tin Pl.)	
	104	**Screw,** No. 14-24x$\frac{1}{2}$" Fil. Hd. S. (Tin Pl.) Dummy Post in connector space when connector is not used.	
	105	**Screw,** No. 14-24x1$\frac{3}{16}$" Fil. Hd. S. (Tin Pl.) Dummy Post in front contact space when neither front nor back neutral contacts are used.	
	106	**Screw,** No. 14-24x1$\frac{5}{8}$" Fil. Hd. S. (Tin Pl.) Dummy Post in back contact spaces when neither front nor back neutral contacts are used.	
410442	**107**	**Nut**	
25107	**108**	**Bushing**	C–7459–2
145747	**109**	**Washer**	7828–218
198567	**110**	**Spacer**	11893–782
100769	**111**	**Contact Tip** (Silver Imp. Carbon) for polar cut section	8341–518
	112	**Contact Spring with Flex. Connector**	8385–2336



Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

For complete Relays refer to Plate E-5111.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
162259	2	**Top Plate,** without Cores for Four and Six Point Relays	C–9271–4
163292	3	**Base, with Glass Shields, Gasket and Shield Supports** (Inc. 1-3c, 4-4, 1-5 and 4-6) for six point relay	C–9278–2
163293	3a	**Base, with Glass Shields, Gasket and Shield Supports** (Inc. 1-3b, 4-4, 1-5 and 4-6) for four point relay	C–9278–2
163291	3b	**Base,** for Ref. 3a (Inc. 1-3e, 4-81, 1-79 and 4-83)	C–9278–2
163289	3c	**Base,** for Ref. 3 (Inc. 1-3d, 4-81, 1-79 and 4-83)	C–9278–2
163288	3d	**Base Plate Only**	C–9278–2
163290	3e	**Base Plate Only**	C–9278–2
163294	4	**Glass Shield** (Side and End)	8163–294
159483	5	**Gasket**	8078–1470
142653	6	**Shield Support**	10932–29
163328	7	**Armature with Bracket, Trunnions and Lock Washers** (Inc. 1-7b, 1-8, 2-9 and 2-10) for six point relay	C–9271–3
157244	7a	**Armature with Bracket, Trunnions and Lock Washers** (Inc. 1-7c, 1-8, 2-9 and 2-10) for four point relay	C–9271–3
163327	7b	**Armature Only,** for Ref. 7	8157–375
157246	7c	**Armature Only,** for Ref. 7a	8157–366
157243	8	**Bracket** for Refs. 7 and 7a	8303–107
159814	9	**Trunnion Screw**	8378–354
159815	10	**Lock Washer,** for Ref. 9	8486–395
57497	11	**Pin,** for Ref. 8	8097–872
	12	**Machine Screw** No. 8-36x½″ Fil. Hd. Br. (N.P.) for Ref. 8.	
138218	13	**Nut** for Center Post Ref. 30	8265–252

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
157855	**14**	**Back Strap**	8162–231
	15	**Cap Screw** $\frac{5}{16}$"-18x$\frac{3}{4}$" **Hex. Hd. S. (Cad. Pl.) for** Ref. 14.	
157218	**16**	**Insulation Block**	8750–2348
163325	**17**	**Polar Armature**	8157–374
157854	**18**	**Trunnion Screw** for Ref. 17	8378–353
26545	**19**	**Nut** for Ref. 18	8109–181
149076	**20**	**Stop Screw**	8098–549
149339	**21**	**Lock Washer**	8486–368
1506	**22**	**Nut** for Ref. 20	8109–12
148207	**23**	**Terminal Post with Nuts, Washers, Screw and Lock Washer** (Inc. 1-23a, 2-31, 1-32, 1-33, 2-34 and 1-35)	12451–241
131237	**23a**	**Terminal Post Only,** for Ref. 23	8094–1192
170895	**24**	**Terminal Post with Nuts, Washers, Screw and Lock Washer** (Inc. 1-24a, 2-31, 1-32, 1-33, 2-34, 1-35, 1-42 and 1-43)	12451–239
157863	**24a**	**Terminal Post Only,** for Ref. 24	8094–2125
170896	**25**	**Terminal Post with Nuts, Washers, Screw and Lock Washer** (Inc. 1-25a, 2-31, 1-32, 1-33, 2-34, 1-35, 1-42 and 1-43)	12451–239
158035	**25a**	**Terminal Post Only,** for Ref. 25	8094–2125
	26	**Terminal Post with Nuts and Washers** (Inc. 1-26a, 2-31, 2-32, 1-33, 3-34 and 1-35)	12451–
130200	**26a**	**Terminal Post Only,** for Ref. 26	8094–1192
170911	**27**	**Terminal Post with Nuts and Washers** (Inc. 1-27a, 2-31, 1-32, 1-33, 2-34 and 1-35)	12451–241
112417	**27a**	**Terminal Post Only,** for Ref. 27	8094–1192

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
170910	**28**	**Terminal Post with Nuts, Washers, Lock Washer and Screw** (Inc. 1-28a, 2-31, 1-32, 1-33, 2-34, 1-35, 1-42 and 1-43)	12451–239
157858	**28a**	**Terminal Post Only,** for Ref. 28	8094–2235
148205	**29**	**Terminal Post with Nuts, Washers, Lock Washer and Screw** (Inc. 1-29a, 2-31, 1-32, 1-33, 2-34, 1-35, 1-42 and 1-43)	12451–239
131234	**29a**	**Terminal Post Only,** for Ref. 29	8094–2125
	30	**Center Post** with Nuts (Inc. 1-30a, 1-33 and 1-13)	12451–
158034	**30a**	**Center Post Only,** for Ref. 30	8098–876
29101	**31**	**Nut**	8109–193
29103	**32**	**Nut**	8109–194
72948	**33**	**Nut**	8109–383
29102	**34**	**Washer**	7828–139
69705	**35**	**Washer**	7828–287
163563	**36**	**Back Post L.H.** (Silver Tip) (Low Voltage)	8094–2261
163564	**36a**	**Back Post R.H.** (Silver Tip) (Low Voltage)	8094–2261
159558	**37**	**Back Post R.H.** for Polar Contacts	8094–2233
159559	**37b**	**Back Post L.H.** for Polar Contacts	8094–2233
159125	**38**	**Silver Contact Tip** for Polar Contacts	8094–2240
158043	**38a**	**Silver Imp. Carbon Contact Tip** for Polar Contacts	8341–476
37789	**39**	**Pin,** for Permanent Magnet	8097–279
168161	**40**	**Silver Imp. Carbon Contact Tip,** for Front Post of Neutral Contacts	8341–476
62977	**42**	**Screw**	8098–845
134516	**43**	**Lock Washer**	8486–368

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
57996	**44**	**Adjusting Screw**	8098–845
131245	**45**	**Front Terminal Post** (Contact Holder)	8094–2122
173737	**46**	**Nut Lock**	8486–403
134400	**47**	**Nut Lock**	8486–371
168308	**48**	**Silver Imp. Carbon Contact Tip** for High Voltage Neutral Contacts	8341–485
161414	**49**	**Contact Spring Complete,** Low Voltage Front and Back for Polarized Contacts (With Flex. Connector)	8385–2336
180284	**50**	**Contact Spring Complete,** Low Voltage Front and Back for Neutral Contacts (With Flex. Connector)	8385–2237
180285	**51**	**Contact Spring Complete,** Low Voltage Front, for Neutral Contacts (With Flex. Connector)	8385–2239
180286	**52**	**Contact Spring Complete,** High Voltage Front, for Neutral Contacts (With Flex. Connector)	8385–2258
180287	**52a**	**Contact Spring Complete,** High Voltage Back, for Neutral Contacts (With Flex. Connector)	8385–2275
180301	**52b**	**Contact Spring Complete,** High Voltage Front and Back, for Neutral Contacts (With Flex. Connector)	8385–2275
163330	**53**	**Connector,** with flexible Connector	8064–691
163329	**53a**	**Connector,** without flexible Connector	8064–691
163332	**54**	**Connector,** with flexible Connector	8064–692
42252	**54a**	**Flexible Connector Only,** for Refs. 53 and 54	10934–87
163331	**54b**	**Connector,** without flexible Connector	8064–692
150113	**55**	**Contact Spring Support**	9968–849
142673	**56**	**Screw**	8098–1300
150140	**57**	**Lock Washer**	8486–367
150166	**58**	**Screw**	8098–550

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
188130	**59**	**Screw** with Nut Ref. 59b (used when shipping)	12471–26
137935	**59a**	**Screw** (used in place of Ref. 59 when installed)	8098–1289
537	**59b**	**Nut** for Ref. 59	8109–1
151836	**60**	**Nut**	8109–445
168826	**61**	**Washer** ($\frac{1}{16}$" thick)	8098–1499
	64	**Pair of Cores** (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	8250–83
157235	**65**	**Permanent Magnet Core**	8101–338
104169	**68**	**Nut**	8265–359
157229	**70**	**Core Pin**	8097–973
157231	**71**	**Core Pin Bracket**	8303–106
157228	**72**	**Core Pin**	8114–717
157230	**73**	**Screw**	8098–1300
28166	**75**	**Nut**	8109–192
	76	**Terminal Post with Nuts and Washers for Magnet Leads** (Inc. 1-76a, 3-32, 1-33, 2-34 and 1-35)	12451–
115706	**76a**	**Terminal Post Only** for Ref. 76	8094–1192
34340	**79**	**Ventilator**	C–7459–6
	80	**Magnet Coil, with Leads and Terminals** (For dimensions and resistances refer to Plate E-5025)	8133–
157224	**81**	**Corner Post**	8114–632
20686	**82**	**Washer**	7828–108
215584	**83**	**Stud**	8114–631
	84	**Terminal Post** with Nut Ref. 33 (Used as dummy post in back contact space when front contact only is used)	12451–

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
130593	84a	**Terminal Post Only**	8094–1192
	85	**Terminal Post with Nuts and Washers** (Inc. 1-85a, 2-31, 1-32, 1-33, 2-34, 1-35, 1-42 and 1-43)	12451–
170642	85a	**Terminal Post Only**	8094–2125
170792	86	**Connector, with Flexible Connector** (When high voltage F.&B. contacts are used)	8064–691
170791	86a	**Connector,** without flexible connector	8064–691
180848	87	**Name Plate**	8225–420
	88	**Screw,** No. 4-40x¼" Rd. Hd. (Tin Pl.)	
184680	89	**Coil Lock**	8735–784
25107	90	**Bushing**	C–7459–2
145747	91	**Washer**	7828–218
198567	92	**Spacer**	11893–782
173298	93	**Wall Type Shock Absorber Base** (For details refer to Ref. Ff of Plate E-5030)	12404–28
172595	94	**Shelf Type Shock Absorber Base** (For details refer to Ref. Ef of Plate E-5030)	12404–27
	95	**Screw,** No. 14-24x¾" Fil. Hd. S. (Tin Pl.) Dummy Post in all connector spaces, except end, for Relays without neutral contacts.	
410442	96	**Nut.**	
	97	**Screw,** No. 14-24x1 3/16" Fil. Hd. S. (Tin Pl.) Dummy Post in all front contact spaces, except end, for Relays without neutral contacts.	
	98	**Screw,** No. 14-24x1⅝" Fil. Hd. S. (Tin Pl.) Dummy Post in all back contact spaces, except end, for Relays without neutral contacts.	
	99	**Screw,** No. 14-24x 9/16" Fil. Hd. S. (Tin Pl.) Dummy Post in coil connector spaces, section Y-Y, for 4-Point Relays and Relays without neutral contacts.	

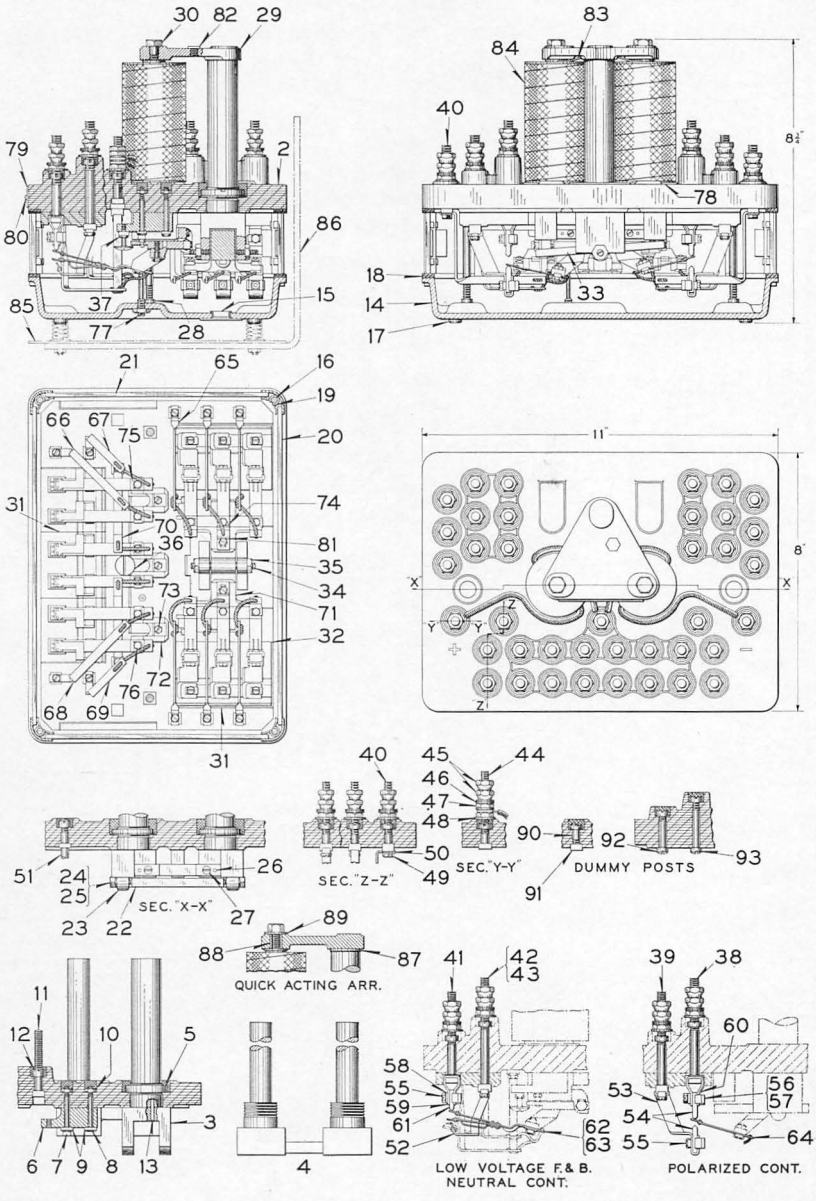
Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Four Normal and Four Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	100	**Terminal Post with Nuts and Washers** (Inc. 1-100a, 2-31, 1-32, 1-33, 4-34 and 1-35) Coil Terminal Post for 4-Point Relays and Relays without neutral contacts	12451–
210080	**100a**	**Terminal Post Only**	8094–2207
142777	**101**	**Tag** (Orders should specify marking desired)	8988–75
161270	**102**	**Insulation Block** (For use with 4-Point Relays or Relays without Neutral Contacts)	8750–2348
	103	**Screw,** No. 14-24x1¼" Fil. Hd. S. (Tin Pl.) Dummy Post in end front contact spaces for Relays without neutral contacts.	
167457	**104**	**Back Post, L.H.** (Silver Imp. Carbon Tip)	8094–2281
167458	**105**	**Back Post, R.H.** (Silver Imp. Carbon Tip)	8094–2281
170643	**106**	**Back Post, L.H.** (Silver Imp. Carbon Tip)	8094–2288
170644	**107**	**Back Post, R.H.** (Silver Imp. Carbon Tip)	8094–2288



Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Six Normal and Six Reverse Polar Contacts)

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Six Normal and Six Reverse Polar Contacts)

For complete Relays refer to Plate E-5112.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
172799	**2**	**Top Plate** without Cores	C–9271–5
157235	**3**	**Permanent Magnet Core**	8101–338
	4	**Pair of Cores** (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	8250–83
104169	**5**	**Nut**	8265–359
157231	**6**	**Core Pin Bracket**	8303–106
157228	**7**	**Core Pin**	8114–717
157230	**8**	**Screw**	8098–1300
149339	**9**	**Lock Washer**	8486–368
28166	**10**	**Nut**	8109–192
	11	**Terminal Post with Nuts and Washers for Magnet Leads** (Inc. 1-11a, 1-12, 2-46, 3-47 and 1-48)	12451–
115706	**11a**	**Terminal Post Only**	8094–1192
72948	**12**	**Nut**	8109–383
37789	**13**	**Pin** for Permanent Magnet	8097–279
173396	**14**	**Base with Glass Shields, Gasket and Shield supports** (Inc. 1-14a, 1-18, 4-19, 2-20 and 2-21)	C–9271–6
173395	**14a**	**Base Plate Complete** for Ref. 14 (Inc. 1-14b, 1-15, 4-16 and 4-17)	C–9271–6
173394	**14b**	**Base Plate Only**	C–9271–6
34340	**15**	**Ventilator**	C–7450–6
157224	**16**	**Corner Post**	8114–632
215584	**17**	**Stud**	8114–631
173351	**18**	**Gasket**	8078–1515
142653	**19**	**Shield Support**	10932–29

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Six Normal and Six Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
173391	**20**	**Glass Shield** (Side)	8163–294
173390	**21**	**Glass Shield** (End)	8163–294
173539	**22**	**Armature with Bracket, Pivot Screws and Lock Washers** (Inc. 1-22a, 1-23, 2-24 and 2-25)	C–9271–7
173458	**22a**	**Armature Only,** for Ref. 22	8157–392
173451	**23**	**Armature Bracket**	8303–116
159814	**24**	**Pivot Screw**	8378–354
159815	**25**	**Lock Washer**	8486–395
57497	**26**	**Pin**	8097–872
	27	**Machine Screw,** No. 8-36x½" Fil. Hd. Br. (N.P.)	
138218	**28**	**Nut**	8265–252
157855	**29**	**Back Strap**	8162–231
	30	**Cap Screw,** 5/16"-18x¾" Hex. Hd. S. (Cad. Pl.)	
157218	**31**	**Insulation Block**	8750–2348
161270	**32**	**Insulation Block**	8750–2348
173481	**33**	**Polar Armature**	8157–394
157854	**34**	**Trunnion Screw** for Ref. 33	8378–353
26545	**35**	**Nut** for Ref. 34	8109–181
149076	**36**	**Stop Screw**	8098–549
1506	**37**	**Nut**	8109–12
	38	**Terminal Post with Nuts and Washers** (Inc. 1-38a, 1-12, 2-45, 2-46, 1-47 and 1-48)	12451–
157862	**38a**	**Terminal Post Only**	8094–2207
	39	**Terminal Post with Nuts, Washers and Screw** (Inc. 1-39a, 1-12, 2-45, 2-46, 1-47, 1-48, 1-49 and 1-50).	12451–

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Six Normal and Six Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
173799	**39a**	**Terminal Post Only**	8094–2235
	40	**Terminal Post with Nuts, Washers and Screw** (Inc. 1-40a, 1-12, 2-45, 2-46, 1-47 and 1-48)	12451–
158035	**40a**	**Terminal Post Only**	8094–2125
	41	**Terminal Post with Nuts and Washers** (Inc. 1-41a, 1-12, 2-45, 2-46, 1-47 and 1-48)	12451–
131237	**41a**	**Terminal Post Only**	8094–1192
	42	**Terminal Post with Nuts, Washers and Screw** (Inc. 1-42a, 1-12, 2-45, 2-46, 1-47, 1-48, 1-49 and 1-50)	12451–
157863	**42a**	**Terminal Post Only**	8094–2125
	43	**Terminal Post** with Nut Ref. 12 (Used as dummy post in back contact space when front contact only is used)	12451–
130593	**43a**	**Terminal Post Only**	8094–1192
	44	**Terminal Post with Nuts and Washers** (Inc. 1-44a, 1-12, 2-45, 2-46, 1-47, 1-48, 1-49 and 1-50)	12451–
113978	**44a**	**Terminal Post Only**	8094–1192
29101	**45**	**Nut**	8109–193
29102	**46**	**Washer**	7828–139
29103	**47**	**Nut**	8109–194
69705	**48**	**Washer**	7828–287
62977	**49**	**Screw**	8098–845
134516	**50**	**Lock Washer**	8486–368
	51	**Center Post with Nuts** (Inc. 1-51a, 1-12 and 1-28)	12471–
173826	**51a**	**Center Post Only**	8098–876
163564	**52**	**Back Post R.H.** (Silver Tip) (Low Voltage)	8094–2261

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Six Normal and Six Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
163563	**52a**	**Back Post L.H.** (Silver Tip) (Low Voltage)	8094–2261
159558	**53**	**Back Post R.H.** for Polar Contacts	8094–2233
159559	**53a**	**Back Post L.H.** for Polar Contacts	8094–2233
158043	**54**	**Silver Imp. Carbon Contact Tip** for Polar Contacts	8341–476
57996	**55**	**Screw**	8098–845
173737	**56**	**Nut Lock**	8486–403
151836	**57**	**Nut**	8109–445
20686	**58**	**Washer**	7828–108
131245	**59**	**Terminal Post** (Front Contact Holder)	8094–2122
134400	**60**	**Lock Washer**	8486–371
168161	**61**	**Silver Imp. Carbon Contact Tip** for front post of neutral contacts (Low Voltage)	8341–476
180284	**62**	**Contact Spring Complete,** Low Voltage Front and Back for Neutral Contacts (With Flex. Connector)	8385–2237
180285	**62a**	**Contact Spring Complete,** Low Voltage Front, for Neutral Contacts (With Flex. Connector)	8385–2239
180286	**63**	**Contact Spring Complete,** High Voltage Front, for Neutral Contacts (With Flex. Connector)	8385–2258
180287	**63a**	**Contact Spring Complete,** High Voltage Back, for Neutral Contacts (With Flex. Connector)	8385–2275
180301	**63b**	**Contact Spring Complete,** High Voltage Front and Back, for Neutral Contacts (With Flex. Connector)	8385–2275
	64	**Contact Spring Complete,** Low Voltage Front and Back, for Polarized Contacts (With Flex. Connector)	8385–2336
173499	**65**	**Connector** (Without Flex. Connector)	8064–721
158144	**66**	**Connector** (Without Flex. Connector)	8064–675
158140	**67**	**Connector** (Without Flex. Connector)	8064–674

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Six Normal and Six Reverse Polar Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
158142	**68**	**Connector** (Without Flex. Connector)	8064–675
158138	**69**	**Connector** (Without Flex. Connector)	8064–674
173932	**70**	**Connector** (Without Flex. Connector)	8064–723
170966	**71**	**Contact Spring Support**	9968–1014
150113	**72**	**Contact Spring Support**	9968–849
142673	**73**	**Screw**	8098–1300
171092	**74**	**Lock Washer**	8486–405
150140	**75**	**Lock Washer**	8486–367
150166	**76**	**Screw**	8098–550
	77	**Screw** with Nut Ref. 77b (used when shipping)	12471–
142642	**77a**	**Screw Only**	8098–1298
537	**77b**	**Nut**	8109–1
168826	**78**	**Washer** ($\frac{1}{16}$" thick)	8078–1499
174100	**79**	**Name Plate**	8225–402
	80	**Screw,** No. 4-40x$\frac{1}{4}$" Rd. Hd. (Tin Pl.)	
178251	**81**	**Lock Washer**	8486–405
137935	**82**	**Screw** (Used in place of Ref. 77 when installed)	8098–1289
184680	**83**	**Coil Lock**	8735–784
	84	**Magnet Coil, With Leads and Terminals** (for dimensions and resistances refer to Plate E-5025)	8133–
173413	**85**	**Shelf Type Shock Absorber Base** (For details refer to Ref. Eg of Plate E-5030)	12404–27
173530	**86**	**Wall Type Shock Absorber Base** (For details refer to Ref. Fg of Plate E-5030)	12404–28
198567	**87**	**Spacer**	11893–782

Details of Style "DP-14" Polarized Relay

(Four and Six Point Neutral and Six Normal and Six Reverse Polar Contacts)

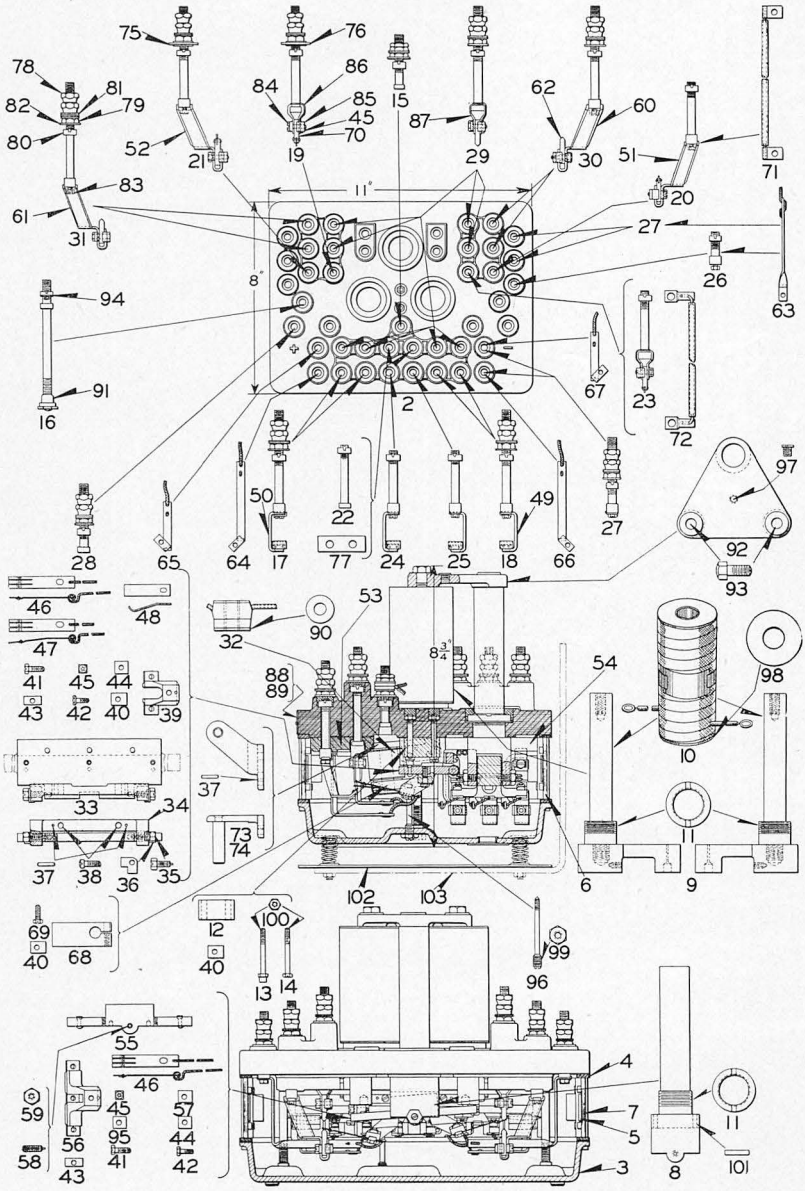
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
25107	**88**	**Bushing**	C–7459–2
145747	**89**	**Washer**	7828–218
	90	**Machine Screw,** No. 14-24x5/8" Fil. Hd. S. (Tin Pl.) Dummy Post in connector spaces for 4-Point Relays.	
410442	**91**	**Nut.**	
	92	**Machine Screw,** No. 14-24x1 3/16" Fil. Hd. S. (Tin Pl.) Dummy Post in front contact spaces for 4-Point Relays.	
	93	**Machine Screw,** No. 14-24x1 5/8" Fil. Hd. S. (Tin Pl.) Dummy Post in back contact spaces for 4-Point Relays.	

PLATE E-5165

UNION SWITCH & SIGNAL CO.



DETAILS OF STYLE "DP-17" POLARIZED RELAY

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY

For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
172799	**2**	**Top Plate** (without Cores)	C–9271–5
173396	**3**	**Base, complete** with Gasket, Corner Brackets and Glass Shields (Inc. 1-3a, 1-4, 4-5, 2-6 and 2-7)	C–9271–6
173395	**3a**	**Base only,** with Ventilator, for Ref. 3	C–9271–6
173351	**4**	**Gasket** for Refs. 2 and 3	8078–1515
142653	**5**	**Corner Bracket**	10932–29
173391	**6**	**Side Shield** (Glass)	8163–294
173390	**7**	**End Shield** (Glass)	8163–294
157235	**8**	**Permanent Magnet Core**	8101–338
181594	**9**	**Magnet Cores (Pair), complete** with Pole Pieces	C–9271–8
	10	**Magnet Coil, complete** with Leads and Terminals (Specify operating Voltage of Relay when ordering Coil)	8133–365
131210	**11**	**Nut** for Refs. 9 and 10	8109–426
160334	**12**	**Core Pin Bracket**	8303–109
157228	**13**	**Core Pin**	8114–717
157230	**14**	**Screw**	8098–1300
	15	**Terminal Post, complete** with Nuts and Washers, (Inc. 1-15a, 3-79, 1-80, 2-81 and 1-82) for Magnet Coil Leads	12451–
115706	**15a**	**Terminal Post only,** for Ref. 15	8094–1192
	16	**Terminal Screw, complete** with Nuts and Washer (Inc. 1-16a, 1-80, 1-91 and 1-94)	12451–
173826	**16a**	**Terminal Screw only,** for Ref. 16	8098–876

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY

(Continued)

For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	17	**Terminal Post, complete** with Nuts, Washers, Lock Washers, L. H. Back Post, and Screw (Inc. 1-17a, 1-43, 1-50, 2-78, 1-79, 1-80, 2-81, 1-82 and 1-83) for Back Post for Neutral Contacts	12451–
160845	17a	**Terminal Post only**, for Refs. 17 and 18	8094–2125
	18	**Terminal Post, complete** with Nuts, Washers, Lock Washers, R. H. Back Post, and Screw (Inc. 1-17a, 1-43, 1-49, 2-78, 1-79, 1-80, 2-81, 1-82 and 1-83) for Back Post for Neutral Contacts	12451–
	19	**Terminal Post, complete** with Nuts, Washers, Lock Washers, Contact Holder and Silver Contact (Inc. 1-19a, 1-43, 1-45, 1-70, 1-76, 2-78, 1-79, 1-80, 2-81, 1-82, 1-84, 1-85, 1-86 and 1-87) for Front Post, for Internal Control Contacts	12451–
157862	19a	**Terminal Post only**, for Refs. 19 and 29	8094–2207
	20	**Terminal Post, complete** with Nut, Lock Washer and Screw (Inc. 1-20a, 1-51, 1-80 and 1-83) for Back Post for Internal Control Contacts	12451–
173670	20a	**Terminal Post only**, for Ref. 20	8094–2235
	21	**Terminal Post, complete** with Nuts, Washers, Lock Washers and Contact Post (Inc. 1-21a, 1-52, 1-75, 2-78, 1-79, 1-80, 2-81, 2-82 and 1-83) for Back Post for Internal Contact	12451–
173799	21a	**Terminal Post only**, for Refs. 21, 30 and 31	8094–2235
	22	**Terminal Post, complete** with Nut (Inc. 1-22a and 1-80) for Front Posts of Internal Control Contact	12451–
160475	22a	**Terminal Post only**, for Refs. 22 and 23	8094–2207
	23	**Terminal Post, complete** with Nuts, Washers, Lock Washers, Contact Holder and Silver Contact (Inc. 1-22a, 1-43, 1-45, 1-70, 1-80, 1-84, 1-85, 1-86 and 1-87) for Front Post for Internal Control Contact	12451–

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY

(Continued)

For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	24	**Terminal Post, complete** with Nut, Back Post and Screw (Inc. 1-24a, 1-50 and 1-80) for Back Post for Neutral Contact	12451–
173761	24a	**Terminal Post only,** for Refs. 24 and 25	8094–2125
	25	**Terminal Post, complete** with Nut, Back Post and Screw (Inc. 1-24a, 1-49, 1-80 and 1-83) for Back Post for Neutral Contact	12451–
	26	**Terminal Post, complete** with Nut and Screw (Inc. 1-26a, 1-80 and 1-83)	12451–
173682	26a	**Terminal Post only,** for Ref. 26	8094–2125
	27	**Terminal Post, complete** with Nuts, Washers and Lock Washer (Inc. 1-27a, 1-43, 2-78, 1-79, 1-80, 2-81, 1-82 and 1-83)	12451–
158035	27a	**Terminal Post only,** for Ref. 27	8094–2125
	28	**Terminal Post, complete** with Nuts and Washers (Inc. 1-28a, 2-78, 1-79, 1-80, 3-81 and 1-82) for Magnet Leads	12451–
130593	28a	**Terminal Post only,** for Ref. 28	8094–1192
	29	**Terminal Post, complete** with Nuts, Washers, Lock Washers, Contact Holder and Silver Impreg. Carbon Tip (Inc. 1-19a, 1-43, 1-45, 1-62, 2-78, 1-79, 1-80, 2-81, 1-82, 1-84, 1-85, 1-86 and 1-87) for Front Post for Polar Contacts	12451–
	30	**Terminal Post, complete** with Nuts, Washers, Lock Washers and Contact Post (Inc. 1-21a, 1-43, 1-60, 2-78, 1-79, 1-80, 2-81, 1-82 and 1-83) for Back Post for Polar Contacts	12451–
	31	**Terminal Post, complete** with Nuts, Washers, Lock Washers and Contact Post (Inc. 1-21a, 1-43, 1-61, 2-78, 1- 79, 1-80, 4-81, 1-82 and 1-83) for Back Post for Polar Contacts	12451–

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY

(Continued)

For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	32	**Neutralizing Coil** used with Internal Control Contacts (Specify operating voltage of Relay when ordering Coil)	8133–409
173538	33	**Neutral Armature, complete** with Bracket and Trunnion Screws (Inc. 1-33a, 1-34, 2-35 and 2-36)	C–9271–7
173456	33a	**Neutral Armature only,** for Ref. 33	8157–393
173451	34	**Bracket** for Ref. 33	8303–116
159814	35	**Trunnion Screw,** for Ref. 33	8378–354
159815	36	**Lock Washer,** for Ref. 33	8486–395
57497	37	**Pin** for Ref. 34	8097–872
	38	**Machine Screw, No. 8-36x½″** Fil. Hd. Br. (N. P.)	
150113	39	**Contact Spring Support** for Neutral Contacts	9968–849
149339	40	**Lock Washer**	8486–368
142673	41	**Screw**	8098–1300
150166	42	**Screw**	8098–550
134516	43	**Lock Washer**	8486–368
150140	44	**Lock Washer**	8486–367
151836	45	**Nut**	8109–445
170726	46	**Contact Spring, complete** with Connector for Neutral and Polar Contacts	8385–1996
176828	47	**Contact Spring, complete** with Connector for two Center Neutral Contacts	8385–1996
156580	48	**Contact Spring Stop** for Ref. 47	8385–2191

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY

(Continued)

For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
131262	**49**	**R. H. Back Post** (**Silver Tip**) for Neutral Contacts	8094–2123
131261	**50**	**L. H. Back Post** (**Silver Tip**) for Neutral Contacts	8094–2123
167527	**51**	**R. H. Contact Post, complete** with Contact Tip, Screw, Nut and Lock Washer (Inc. 1-51a, 1-43, 1-45, 1-70, 1-84 and 1-85) for Internal Control Contact	8094–2271
159558	**51a**	**R. H. Contact Post only,** for Refs. 51 and 60	8094–2233
165539	**52**	**L. H. Contact Post, complete** with Contact Tip, Screw, Nut and Lock Washer (Inc. 1-52a, 1-43, 1-45, 1-70, 1-84 and 1-85)	8094–2271
159559	**52a**	**L. H. Contact Post only,** for Refs. 52 and 61	8094–2233
157218	**53**	**Insulation Block**	8750–2348
161270	**54**	**Insulation Block**	8750–2348
173481	**55**	**Polar Armature, complete**	8157–394
170966	**56**	**Contact Spring Support** for Polar Contacts	9968–1014
178251	**57**	**Lock Washer**	8486–405
157854	**58**	**Trunnion Screw** for Ref. 55	8378–353
26545	**59**	**Nut** for Ref. 58	8109–181
165540	**60**	**R. H. Back Contact Post, complete** with Silver Impreg. Carbon Contact (Inc. 1-51a, 1-43, 1-45, 1-62, 1-84 and 1-85)	8094–2271
167528	**61**	**L. H. Back Contact Post, complete** with Silver Impreg. Carbon Contact (Inc. 1-52a, 1-43, 1-45, 1-62, 1-84 and 1-85)	8094–2271
158043	**62**	**Contact Tip** (Silver Impreg. Carbon)	8341–476

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY
(Continued)

For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
173502	**63**	**Connector, complete** with Flexible Connector	8064–721
158145	**64**	**Connector, complete** with Flexible Connector	8064–675
158141	**65**	**Connector, complete** with Flexible Connector	8064–674
158143	**66**	**Connector, complete** with Flexible Connector	8064–675
158139	**67**	**Connector, complete** with Flexible Connector	8067–674
42252	**67a**	**Flexible Connector only**, for Refs. 63 to 67 inclusive	10934–87
173407	**68**	**Hold Down Pole Piece**	8250–91
161271	**69**	**Screw**	8098–1300
159125	**70**	**Contact Tip (Silver)**	8094–2240
173664	**71**	**Lead, 8″ Long**, for Connecting Internal Control Back Contacts	8064–722
173665	**72**	**Lead, 6″ Long**, for Connecting Internal Control Front Contacts	8064–722
160359	**73**	**R. H. Hold Down Bracket, complete** with Core	8075–221
160361	**74**	**L. H. Hold Down Bracket, complete** with Core	8075–221
142777	**75**	**Tag**, marked Positive	8988–75
142777	**76**	**Tag**, marked Negative	8988–75
32814	**77**	**Clip** for Leads	8486–133
29101	**78**	**Nut**	8109–193
29103	**79**	**Nut**	8109–194
72948	**80**	**Nut**	8109–383

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY
(Continued)

For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
29102	**81**	**Washer**	7828–139
69705	**82**	**Washer**	7828–287
131239	**83**	**Screw**	8098–845
57996	**84**	**Adjusting Screw**	8098–845
173737	**85**	**Lock Washer**	8486–403
134400	**86**	**Lock Washer**	8486–371
131245	**87**	**Contact Holder**	8094–2122
173546	**88**	**Name Plate**	8225–398
	89	**Screw, No. 4x1/4″ Rd. Hd. (N. P.).**	
135649	**90**	**Washer**	8078–1042
138218	**91**	**Nut**	8265–252
157855	**92**	**Back Strap**	8162–231
	93	**Cap Screw, 5/16″-18x3/4″ Hex. Hd. S. (Cad. Pl.).**	
73772	**94**	**Washer**	7826–180
171092	**95**	**Lock Washer**	8486–405
142642	**96**	**Screw, complete** with Nut Ref. 99 (Used when shipping)	8098–1298
137935	**97**	**Screw** (used in place of Ref. 96 when installed)	8098–1289
168826	**98**	**Filler Washer, 1/16″ Thick**	8078–1499
168824	**98a**	**Filler Washer, 1/8″ Thick**	8078–1499
537	**99**	**Nut**	8109–1
28166	**100**	**Nut** for Refs. 13 and 14	8109–192

UNION SWITCH & SIGNAL CO.

DETAILS OF STYLE "DP-17" POLARIZED RELAY

(Continued)

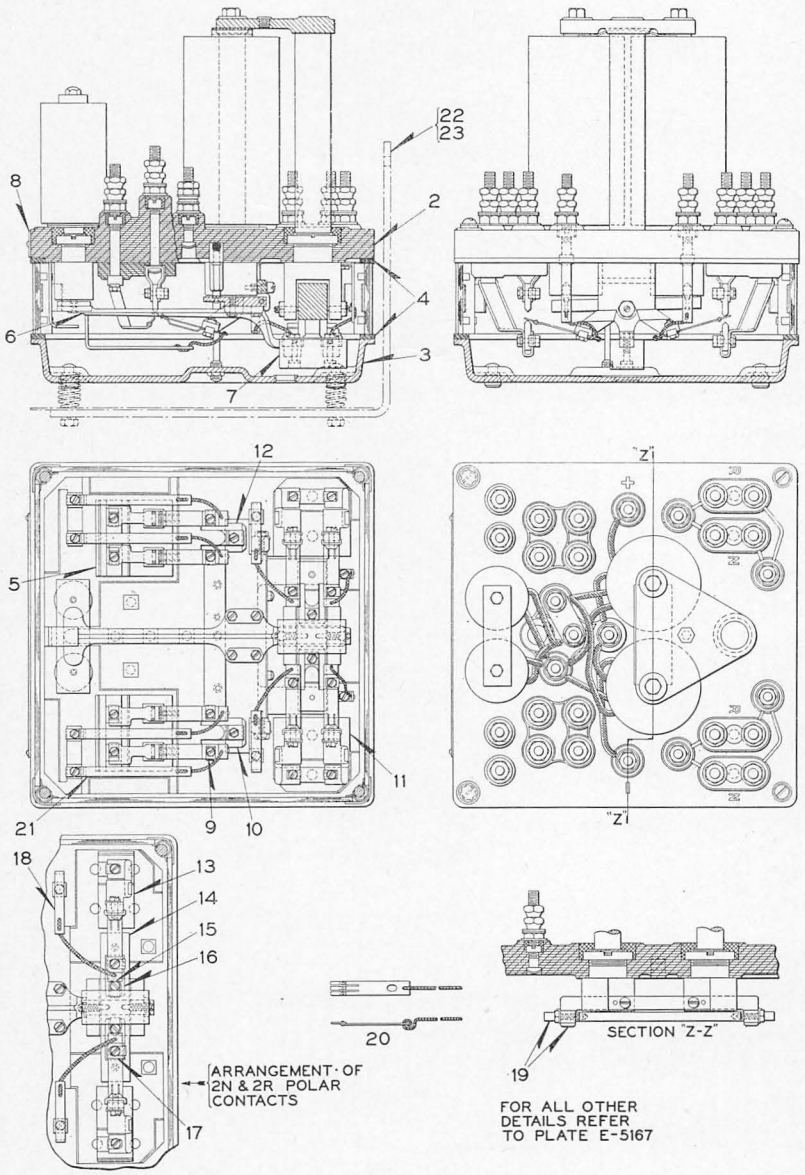
For complete Relays refer to Plate E-5120

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
37789	**101**	**Pin** for Ref. 8	8097–279
173413	**102**	**Shock Absorber Spring, complete** (Shelf Type) As shown in full lines (for details refer to Plate E-5030)	12404–27
173530	**103**	**Shock Absorber Spring, complete** (Wall Type) As shown in full and dot and dash lines (for details refer to Plate E-5030)	12404–28

PLATE E-5166

UNION SWITCH & SIGNAL CO.



FOUR POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY

UNION SWITCH & SIGNAL CO.

FOUR POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY

DETAIL PARTS

For Complete Relays Refer to Plate E-5121

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
182607	2	**Top Plate** without Cores	C–9406–5
182611	3	**Base** with four Glass Shields Ref. 5 Plate E-5167, four Supports Ref. 7 Plate E-5167, and Gasket Ref. 4 this Plate	C–9406–6
182610	3a	**Base Only** for Ref. 3	C–9406–6
182977	4	**Gasket Only** for Refs. 2 and 3	8078–1559
157218	5	**Insulation Block** for two Contacts	8750–2348
182227	6	**Auxiliary Armature, Arm and Counterweight Complete**	C–9406–1
182257	7	**Counterweight** for Ref. 6	9672–214
182612	8	**Name Plate** for 4N and 4R Polar Contacts	8225–443
182845	8a	**Name Plate** for 2N and 2R Polar Contacts	8225–445
134516	9	**Lock Washer**	8486–368
149339	10	**Lock Washer**	8486–368
182618	11	**Insulation Block** for two Contacts	8750–2348
150113	12	**Contact Spring Support**	9968–849
161270	13	**Insulation Block** for one Contact	8750–2348
182620	14	**Polar Armature, Complete** with Core Pins and Bushings for 2N and 2R Polar Contacts	8157–407
155340	15	**Lock Washer**	8486–368
141189	16	**Contact Spring Support**	9968–702
131258	17	**Lock Washer**	8486–367
182621	18	**Connector Complete** with Flexible Connector	8064–692

UNION SWITCH & SIGNAL CO.

FOUR POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY
(Continued)

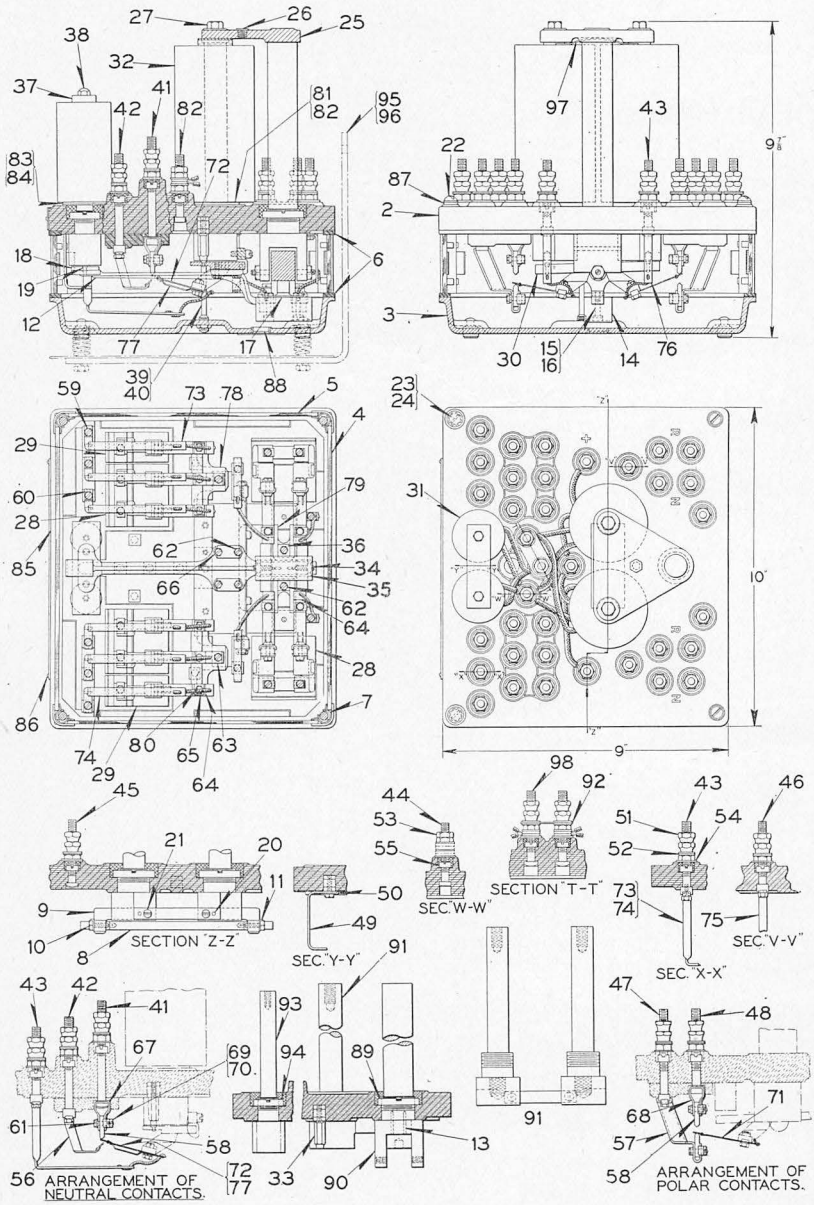
DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
163331	**18a**	**Connector** (Without Flexible Connector)	8064–692
182615	**19**	**Armature with Bracket, Screws and Lock Washers**	C–9406–4
182614	**19a**	**Armature Only,** for Ref. 19	8157–406
161414	**20**	**Contact Spring Complete** with Flexible Connector, used in Spaces 2 and 5 of Relays having two Normal and two Reverse Polar Contacts	8385–1996
163330	**21**	**Connector Complete** with Flexible Connector	8064–691
163329	**21a**	**Connector Only,** without Flexible Connector	8064–691
172595	**22**	**Shelf Type Shock Absorber Base Complete** for Style "DP–20" Four Point Relay (For details refer to Ref. Ef, Plate E-5030)	12404–27
173298	**23**	**Wall Type Shock Absorber Base Complete** for Style "DP–20" Four Point Relay (For details refer to Ref. Ff, Plate E-5030)	12404–28
		For all other details refer to Plate E-5167	

PLATE E-5167

UNION SWITCH & SIGNAL CO.



SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY

UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY

DETAIL PARTS

For Complete Relays Refer to Plate E-5121

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
181101	**2**	**Top Plate** without Cores	C–9406–2
181142	**3**	**Base with Glass Shields, Gasket and Shield Supports** (Inc. 1–3a, 2–4, 2–5, 1–6 and 4–7)	C–9406–3
181141	**3a**	**Base Only** for Ref. 3	C–9406–3
181153	**4**	**Glass Shield (Front and Back)** for Ref. 3	8163–309
181152	**5**	**Glass Shield (Sides)** for Ref. 3	8163–309
181155	**6**	**Gasket** for Refs. 2 and 3	8078–1553
181150	**7**	**Shield Support**	10932–33
181278	**8**	**Armature** with Bracket, Screws and Lock Washers (Inc. 1-8a, 1-9, 2-10 and 2-11)	C–9406–4
181178	**8a**	**Armature Only,** for Ref. 8	8157–400
157243	**9**	**Bracket** for Ref. 8	8303–107
164165	**10**	**Pivot Screw**	8378–356
159815	**11**	**Lock Washer**	8486–395
181369	**12**	**Auxiliary Armature, Arm and Counterweight Complete** (Inc. 1-12a, 1-14, 2-15, 2-16, 1-17, 1-18 and 2-19)	C–9406–1
181046	**12a**	**Support Only,** for Ref. 12	C–9406–1
37789	**13**	**Pin**	8097–279
181398	**14**	**Counterweight** for Ref. 12	9672–212
53428	**15**	**Screw**	8098–995
1506	**16**	**Nut**	8109–12

PLATE E-5167

UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY (Continued)

DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
45338	17	**Lock Washer**	8486–155
181186	18	**Armature** for Ref. 12	8157–401
54933	19	**Rivet**	10301–30
57497	20	**Pin**	8097–872
	21	**Machine Screw, No. 8-36x½″** Fil. Hd. Br. (N.P.)	
59371	22	**Screw**	8098–1172
59306	23	**Screw**	8098–1172
73493	24	**Washer**	7826–78
157855	25	**Backstrap**	8162–231
137935	26	**Plug**	8098–1289
	27	**Cap Screw,** $\frac{5}{16}$″**-18x¾″** Hex. Hd. S. (Cad. Pl.)	
157218	28	**Insulation Block** for two Contacts	8750–2348
161270	29	**Insulation Block** for one Contact	8750–2348
181448	30	**Polar Armature Complete** with Core Pins and Bushings	8157–374
182416	31	**Auxiliary Magnet Coil,** 55 Ohms (For 4-Ohm Relay)	8133–427
181445	31a	**Auxiliary Magnet Coil,** 135 Ohms (For Relays of more than 4 Ohms)	8133–427
181676	32	**Main Magnet Coil,** 2 Ohms (2 Ohm Primary and 36 Ohm Secondary, for 4 Ohm Relay)	8133–426
181485	32a	**Main Magnet Coil,** 75 Ohms (75 Ohm Primary and 140 Ohm Secondary, for 150 Ohm Relay)	8133–426

UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY (Continued)

DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
181639	**32b**	**Main Magnet Coil,** 125 Ohms (125 Ohm Primary and 140 Ohm Secondary, for 250 Ohm Relay)	8133–426
181641	**32c**	**Main Magnet Coil,** 200 Ohms (200 Ohm Primary and 140 Ohm Secondary, for 400 Ohm Relay)	8133–426
181444	**32d**	**Main Magnet Coil,** 335 Ohms (335 Ohm Primary and 140 Ohm Secondary, for 670 Ohm Relay)	8133–426
181817	**33**	**Core Pin**	8114–826
157854	**34**	**Trunnion Screw**	8378–353
26545	**35**	**Nut**	8109–181
149339	**36**	**Lock Washer**	8486–368
181184	**37**	**Auxiliary Backstrap**	8162–249
45931	**38**	**Screw**	8098–390
142642	**39**	**Screw** with Nut Ref. 40	8098–1298
537	**40**	**Nut**	8109–1
	41	**Terminal Post Complete** with Nuts, Washers and Lock Washers (Inc. 1-41a, 2-51, 2-52, 1-53, 1-54, 1-55, 1-58, 1-60, 1-61, 1-67, 1-68, 1-69 and 1-70)	12451–
157862	**41a**	**Terminal Post Only** for Ref. 41	8094–2207
	42	**Terminal Post Complete** with Nuts, Washers, Lock Washers and R. H. Back Post (Inc. 1-42b, 2-51, 2-52, 1-53, 1-54, 1-55, 1-56, 1-59 and 1-60)	12451–
	42a	**Terminal Post Complete** with Nuts, Washers, Lock Washers and L. H. Back Post (Inc. 1-42b, 2-51, 2-52, 1-53, 1-54, 1-55, 1-56a, 1-59 and 1-60)	12451–

PLATE E-5167

UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY (Continued)

DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
181217	**42b**	**Terminal Post Only** for Refs. 42 and 42a	8094–2125
	43	**Terminal Post Complete** with Nuts, Washers, and Lock Washers (Inc. 1-43a, 2-51, 2-52, 1-53, 1-54, 1-55, 1-59 and 1-60)	12451–
131234	**43a**	**Terminal Post Only** for Ref. 43	8094–2125
	44	**Terminal Post Complete** with Nuts, Washers and Lock Washers, (Inc. 1-44a, 2-52, 2-53, 1-54 and 1-55)	12451–
115706	**44a**	**Terminal Post Only** for Ref. 44	8094–1192
	45	**Terminal Post Complete** with Nuts, Washers and Lock Washers (Inc. 1-45a, 2-51, 2-52, 1-53, 1-54 and 1-55)	12451–
130593	**45a**	**Terminal Post Only** for Ref. 45	8094–1192
	46	**Terminal Post Complete** with Nuts, Washers and Lock Washers (Inc. 1-46a, 2-51, 2-52, 1-53, 1-54, 1-55, 1-59 and 1-60)	12451–
158035	**46a**	**Terminal Post Only** for Ref. 46	8094–2125
	47	**Terminal Post Complete** with Nuts, Washers, Lock Washers and R. H. Back Post (Inc. 1-47b, 2-51, 2-52, 1-53, 1-54, 1-55, 1-57, 1-59 and 1-60)	12451–
	47a	**Terminal Post Complete** with Nuts, Washers, Lock Washers and L. H. Back Post (Inc. 1-47b, 2-51, 2-52, 1-53, 1-54, 1-55, 1-57a, 1-59 and 1-60)	12451–
157858	**47b**	**Terminal Post Only** for Refs. 47 and 47a	8094–2235
	48	**Terminal Post Complete** with Nuts, Washers and Lock Washers (Inc. 1-48a, 2-51, 2-52, 1-53, 1-54, 1-55, 1-58, 1-60, 1-61, 1-67, 1-68, 1-69 and 1-70)	12451–

UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY (Continued)

DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
112417	**48a**	**Terminal Post Only** for Ref. 48	8094–1192
181188	**49**	**Auxiliary Backstop**	8303–119
164005	**50**	**Lock Washer**	8486–368
29101	**51**	**Nut**	8109–193
29102	**52**	**Washer**	7828–139
29103	**53**	**Nut**	8109–194
69705	**54**	**Washer**	7828–287
72948	**55**	**Nut**	8109–383
131262	**56**	**R. H. Back Post** with Silver Tip	8094–2123
131261	**56a**	**L. H. Back Post** with Silver Tip	8094–2123
165540	**57**	**R. H. Back Post** with Silver Imp. Carbon Tip (Inc. 1-57b, 1-58, 1-60, 1-61, 1-69 and 1-70)	8094–2271
167528	**57a**	**L. H. Back Post** with Silver Imp. Carbon Tip (Inc. 1-57c, 1-58, 1-60, 1-61, 1-69 and 1-70)	8094–2271
159558	**57b**	**R. H. Back Post Only** for Ref. 57	8094–2233
159559	**57c**	**L. H. Back Post Only** for Ref. 57a	8094–2233
158043	**58**	**Contact Tip,** Silver Imp. Carbon	8341–476
131239	**59**	**Screw**	8098–845
134516	**60**	**Lock Washer**	8486–368
57996	**61**	**Adjusting Screw**	8098–845
142673	**62**	**Screw**	8098–1300

PLATE E-5167

UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY
(Continued)

DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
178251	**63**	**Lock Washer**	8486–405
150140	**64**	**Lock Washer**	8486–367
171092	**65**	**Lock Washer**	8486–405
138073	**66**	**Lock Washer**	8486–155
134400	**67**	**Nut Lock**	8486–371
131245	**68**	**Terminal Post**	8094–2122
173737	**69**	**Nut Lock**	8486–403
151836	**70**	**Nut**	8109–445
170726	**71**	**Contact Spring Complete** with Flexible Connector	8385–1996
180974	**72**	**Contact Spring Complete** with Flexible Connector	8385–2336
181199	**73**	**R. H. Connector Complete** with Flexible Connector	8064–746
181198	**73a**	**R. H. Connector Only,** without Flexible Connector	8064–746
181201	**74**	**L. H. Connector Complete** with Flexible Connector	8064–746
181200	**74a**	**L. H. Connector Only,** without Flexible Connector	8064–746
163332	**75**	**Connector Complete** with Flexible Connector (For 4N and 4R Polar Contacts)	8064–692
163331	**75a**	**Connector Only** without Flexible Connector	8064–692
181197	**76**	**Connector Complete** with Flexible Connector	8064–747
181196	**76a**	**Connector Only,** without Flexible Connector	8064–747
180975	**77**	**Stop Spring**	8735–769
170966	**78**	**Contact Spring Support**	9968–1014

UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY (Continued)

DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
150113	**79**	**Contact Spring Support**	9968–849
150166	**80**	**Screw**	8098–550
168826	**81**	**Washer** ($\frac{1}{16}$" thick)	8078–1499
	82	**Terminal Post Complete** with Nuts, Washers and Lock Washers (Inc. 1-44a, 2–52, 3–53, 1–54 and 1–55)	12451–
181483	**83**	**Washer** ($\frac{1}{16}$" thick)	8078–1499
181481	**84**	**Washer** ($\frac{1}{8}$" thick)	8078–1499
180392	**85**	**Name Plate**	8225–433
	86	**Screw, No. 4x$\frac{1}{4}$"** Type "Z" Rd. Hd. Hardened (N.P.)	
176217	**87**	**Washer**	8078–1407
34340	**88**	**Ventilator**	C–7459–6
131210	**89**	**Nut**	8109–426
	90	**Permanent Magnet Core Complete** (Magnetized and wrapped in corrugated paper for shipping)	8101–355
186213	**91**	**Pair of Coils** (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	C–9271–8
47290	**92**	**Terminal Connector**	8064–305
181182	**93**	**Auxiliary Core**	8101–357
181219	**94**	**Nut**	8109–465
180856	**95**	**Shelf Type Shock Absorber Base Complete** for Style "DP-20" Six Point Relay (Similar to Ref. E, Plate E-5030, dimensions W-8", X-7", Y-10" and Z-9")	12404–27

PLATE E-5167

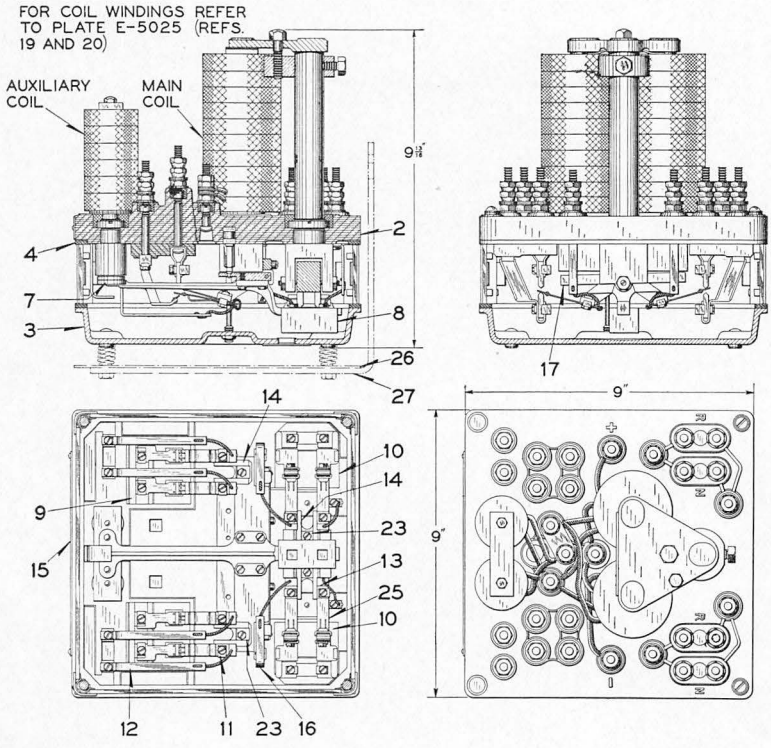
UNION SWITCH & SIGNAL CO.

SIX POINT STYLE "DP-20" RETAINED NEUTRAL POLARIZED RELAY (Continued)

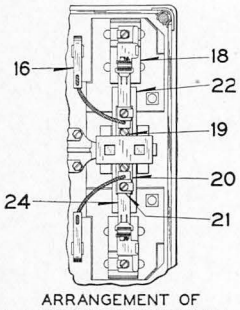
DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

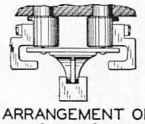
Piece	Ref.	Description	Drawing Reference
180857	**96**	**Wall Type Shock Absorber Base Complete** for Style "DP-20" Six Point Relay (Similar to Ref. F, Plate E-5030 except that dimension V is 8″)	12404–28
184680	**97**	**Flat Spring**	8735–784
	98	**Terminal Post Complete** with Nuts, Washers and Lock Washers (Inc. 1-98a, 2-51, 3-52, 1-53, 1-54 and 1-55)	12451–
113978	**98a**	**Terminal Post Only** for Ref. 98	8094–1192



FOR ALL OTHER DETAILS REFER TO PLATE E-5169



ARRANGEMENT OF 2N & 2R POLAR CONTACTS



ARRANGEMENT OF STYLE "DP-21" RELAY

Four Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Four Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

For complete relays refer to Plate E-5121.
For Coil Windings refer to Refs. 19 and 20, Plate E-5025.
For all other details refer to Plate E-5169.
For details of Relays of original design (recognizable by their use of cap screws in the main cores) refer to Plates E-5166 and E-5167.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
182607	**2**	**Top Plate** without Cores	C–9406–5
182611	**3**	**Base with Glass Shields, Gasket and Shield Supports** (Inc. 1-3a and 1-4 of this Plate and 4-10 and 4-13 of Plate E-5169)	C–9406–6
182610	**3a**	**Base Only**, for Ref. 3	C–9406–6
159483	**4**	**Gasket**	8078–1470
182615	**5**	**Armature with Bracket, Pivot Screws and Lock Washers** (Inc. 1-6 of this Plate and 1-15, 2-17 and 2-18 of Plate E-5169)	C–9406–4
	5a	**Armature with Bracket, Pivot Screws, Lock Washers and Pins** (Inc. 1-5 of this Plate and 2-26 of Plate E-5169)	C–9406–
182614	**6**	**Armature**	8157–406
184337	**7**	**Auxiliary Armature Arm and Counterweight Support Complete** (Inc. 1-8 of this Plate and 1-19a, 1-20, 2-21, 2-23, 2-24 and 1-25 of Plate E-5169)	C–9406–1
182257	**8**	**Counterweight**	9672–214
157218	**9**	**Insulation Block** for two contacts	8750–2348
182618	**10**	**Insulation Block** for two contacts	8750–2348
134516	**11**	**Lock Washer**	8486–368
163329	**12**	**Connector** without Flexible Connector	8064–691
150140	**13**	**Lock Washer**	8486–367
150113	**14**	**Contact Spring Support**	9968–849
182612	**15**	**Name Plate** for 4 Pt. 4N-4R "DP-20" Relay	8225–443
182845	**15a**	**Name Plate** for 4 Pt. 2N-2R "DP-20" Relay	8225–445
184335	**15b**	**Name Plate** for 4 Pt. 4N-4R "DP-21" Relay	8225–453

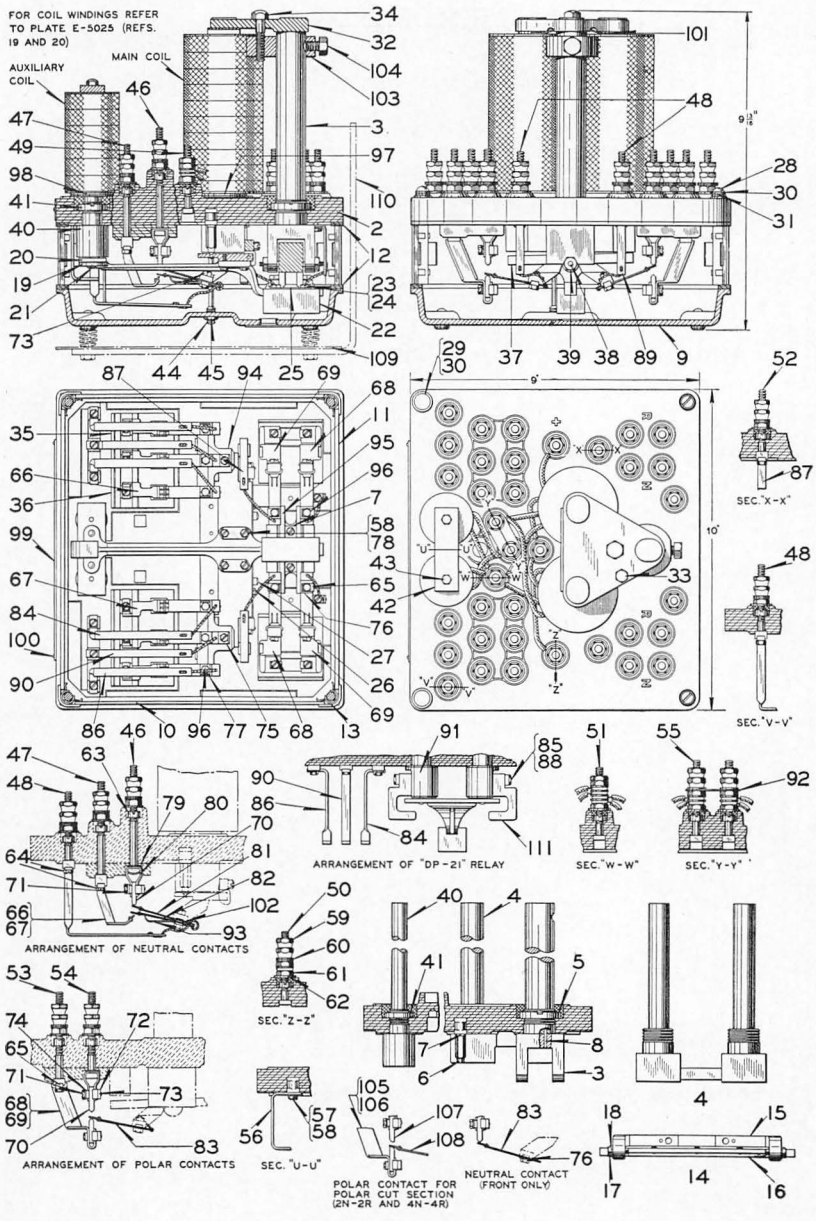
Four Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
184334	**15c**	**Name Plate** for 4 Pt. 2N-2R "DP-21" Relay	8225–452
163331	**16**	**Connector** without Flexible Connector	8064–692
181448	**17**	**Polar Armature with Core Pins and Bushings.** For 4N-4R Polar Contacts	8157–374
163325	**17a**	**Polar Armature with Core Pins and Bushings.** (For Track Relays with Polar Contacts for Polar Cut Section) For 4N-4R Polar Contacts	8157–374
161270	**18**	**Insulation Block** for one contact	8750–2348
155340	**19**	**Lock Washer**	8486–368
141189	**20**	**Contact Spring Support**	9968–702
131258	**21**	**Lock Washer**	8486–367
182620	**22**	**Polar Armature with Core Pins and Bushings** for 2N -2R Polar Contacts	8157–407
197800	**22a**	**Polar Armature with Core Pins and Bushings** for 2N -2R Polar Contacts (For Track Relays with Polar Contacts for Polar Cut Section)	8157–407
149339	**23**	**Lock Washer**	8486–368
	24	**Contact Spring with Flexible Connector** for Polar Contacts on 2N-2R Relays	8385–2336
	25	**Contact Spring with Flexible Connector** for Polar Contacts on 4N-4R Relays	8385–2336
172595	**26**	**Shelf Type Shock Absorber Base Complete** (For details see Ref. Ef, Plate E-5030)	12404–27
173298	**27**	**Wall Type Shock Absorber Base Complete** (For details see Ref. Ff, Plate E-5030)	12404–28



Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

For complete relays refer to Plate E-5121.
For Coil Windings refer to Refs. 19 and 20, Plate E-5025.
For details of Relays of original design (recognizable by their use of cap screws in the main cores) refer to Plates E-5166 and E-5167.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
181101	**2**	**Top Plate** without Cores	C–9406–2
	3	**Permanent Magnet Core Complete** (Magnetized and wrapped in corrugated paper for shipping)	8101–355
182613	**4**	**Pair of Main Cores** (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	C–9271–8
104169	**5**	**Nut**	8265–359
181817	**6**	**Core Pin**	8114–826
149339	**7**	**Lock Washer**	8486–368
37789	**8**	**Pin**	8097–279
181142	**9**	**Base with Glass Shields, Gasket and Shield Supports** (Inc. 1-9a, 2-10, 2-11, 1-12 and 4-13)	C–9406–3
181141	**9a**	**Base Only,** for Ref. 9	C–9406–3
181152	**10**	**Glass Shield** (Sides)	8163–309
181153	**11**	**Glass Shield** (Front and Back)	8163–309
181155	**12**	**Gasket**	8078–1553
181150	**13**	**Shield Support**	10932–33
181278	**14**	**Armature with Bracket, Pivot Screws and Lock Washers** (Inc. 1-15, 1-16, 2-17 and 2-18)	C–9406–4
	14a	**Armature with Bracket, Pivot Screws, Lock Washers and Pins** (Inc. 1-14 and 2-26)	C–9406–
157243	**15**	**Bracket**	8303–107
181178	**16**	**Armature**	8157–400
164165	**17**	**Pivot Screw**	8378–356
159815	**18**	**Lock Washer**	8486–395
184534	**19**	**Auxiliary Armature Arm and Counterweight Support Complete** (Inc. 1-19a, 1-20, 2-21, 1-22, 2-23, 2-24 and 1-25)	C–9406–1

Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
181046	**19a**	**Auxiliary Armature Arm and Counterweight Support Only**	C–9406–1
184336	**20**	**Armature** for Ref. 19	8157–401
54933	**21**	**Rivet**	10301–30
181398	**22**	**Counterweight**	9672–212
53428	**23**	**Screw**	8098–995
1506	**24**	**Nut**	8109–12
45338	**25**	**Nut Lock**	8486–155
57497	**26**	**Pin** (Dowel)	8097–872
	27	**Machine Screw,** No. 8-36x½″ Fil. Hd. Br. (N.P.)	
59371	**28**	**Screw**	8098–1172
59306	**29**	**Screw**	8098–1172
73493	**30**	**Washer**	7826–78
176217	**31**	**Washer**	8078–1407
194251	**32**	**Back Strap**	8162–262
137935	**33**	**Plug**	8098–1289
	34	**Cap Screw,** $\frac{5}{16}$″-18x1¼″ Hex. Hd. S. (Cad. Pl.)	
161270	**35**	**Insulation Block** for one contact	8750–2348
157218	**36**	**Insulation Block** for two contacts	8750–2348
181448	**37**	**Polar Armature with Core Pins and Bushings.** For 4N-4R Polar Contacts	8157–374
163325	**37a**	**Polar Armature with Core Pins and Bushings.** (For Track Relays with Polar Contacts for Polar Cut Section) For 4N-4R Polar Contacts	8157–374
157854	**38**	**Trunnion Screw**	8378–353

Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
26545	**39**	**Nut**	8109–181
181182	**40**	**Auxiliary Core** for "DP-20" Relay	8101–357
181219	**41**	**Nut**	8109–465
181184	**42**	**Auxiliary Back Strap**	8162–249
45931	**43**	**Screw**	8098–390
	44	**Screw** with Nut Ref. 45	12471–
142642	**44a**	**Screw Only**, for Ref. 44	8098–1298
537	**45**	**Nut**	8109–1
	46	**Terminal Post with Nuts and Washers** (Inc. 1-46a, 2-59, 2-60, 1-61, 1-62 and 1-63)	12451–
157862	**46a**	**Terminal Post Only**, for Ref. 46	8094–2207
	47	**Terminal Post with Nuts, Washers and Lock Washer** (Inc. 1-47a, 2-59, 2-60, 1-61, 1-62, 1-63, 1-64 and 1-65)	12451–
181217	**47a**	**Terminal Post Only**, for Ref. 47	8094–2125
	48	**Terminal Post with Nuts, Washers and Lock Washer** (Inc. 1-48a, 2-59, 2-60, 1-61, 1-62, 1-63, 1-64 and 1-65)	12451–
131234	**48a**	**Terminal Post Only**, for Ref. 48	8094–2125
	49	**Terminal Post with Nuts and Washers** (Inc. 1-49a, 2-60, 3-61, 1-62 and 1-63)	12451–
115706	**49a**	**Terminal Post Only**, for Ref. 49	8094–1192
	50	**Terminal Post with Nuts and Washers** (Inc. 1-50a, 2-59, 3-60, 2-61, 1-62 and 1-63)	12451–
130200	**50a**	**Terminal Post Only**, for Refs. 50 and 51	8094–1192
	51	**Terminal Post with Nuts and Washers** (Inc. 1-50a, 4-60, 3-61, 1-62 and 1-63)	12451–

Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	52	**Terminal Post with Nuts, Washers and Lock Washer** (Inc. 1-52a, 2-59, 2-60, 1-61, 1-62, 1-63, 1-64 and 1-65)	12451–
158035	52a	**Terminal Post Only,** for Ref. 52	8094–2125
	53	**Terminal Post with Nuts, Washers and Lock Washer** (Inc. 1-53a, 2-59, 2-60, 1-61, 1-62, 1-63, 1-64 and 1-65)	12451–
157858	53a	**Terminal Post Only,** for Ref. 53	8094–2235
	54	**Terminal Post with Nuts and Washers** (Inc. 1-54a, 2-59, 2-60, 1-61, 1-62 and 1-63)	12451–
112417	54a	**Terminal Post Only,** for Refs. 54 and 55	8094–1192
	55	**Terminal Post with Nuts and Washers** (Inc. 1-54a, 2-59, 3-60, 2-61, 1-62 and 1-63)	12451–
181188	56	**Auxiliary Backstop**	8303–119
164005	57	**Lock Washer**	8486–368
142673	58	**Screw**	8098–1300
29101	59	**Nut**	8109–193
29102	60	**Washer**	7828–139
29103	61	**Nut**	8109–194
69705	62	**Washer**	7828–287
72948	63	**Nut**	8109–383
62977	64	**Screw**	8098–845
134516	65	**Lock Washer**	8486–368
131262	66	**R.H. Back Post with Silver Tip**	8094–2123
131261	67	**L.H. Back Post with Silver Tip**	8094–2123
165540	68	**R.H. Back Post with Silver Imp. Carbon Tip** (Inc. 1-68a, 1-70 and 1-71)	8094–2271
159558	68a	**R.H. Back Post Only,** for Refs. 68 and 105	8094–2233

Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
167528	**69**	**L.H. Back Post with Silver Imp. Carbon Tip** (Inc. 1-69a, 1-70 and 1-71)	8094–2271
159559	**69a**	**L.H. Back Post Only,** for Refs. 69 and 106	8094–2233
158043	**70**	**Contact Tip, Silver Imp. Carbon**	8341–476
	71	**Screw with Nut and Washers** (Inc. 1-65, 1-71a, 1-72, 1-73 and 1-74)	12471–
57996	**71a**	**Screw Only,** for Ref. 71	8098–845
173737	**72**	**Nut Lock**	8486–403
151836	**73**	**Nut**	8109–445
20686	**74**	**Washer**	7828–108
178251	**75**	**Lock Washer**	8486–405
150140	**76**	**Lock Washer**	8486–367
171092	**77**	**Lock Washer**	8486–405
138073	**78**	**Lock Washer**	8486–155
134400	**79**	**Nut Lock**	8486–371
131245	**80**	**Terminal Post** (Front Contact Holder)	8094–2122
140833	**81**	**Contact Spring** (No flexible connector, used with Ref. 82)	8385–2336
	82	**Contact Spring with Flexible Connector**	8385–2443
	83	**Contact Spring with Flexible Connector**	8385–2336
181198	**84**	**Connector** without Flexible Connector	8064–746
184290	**85**	**Screw**	8098–924
181200	**86**	**Connector** without Flexible Connector	8064–746
163331	**87**	**Connector** without Flexible Connector	8064–692
179443	**88**	**Bolt Lock**	8486–399
181196	**89**	**Connector** without Flexible Connector	8064–747

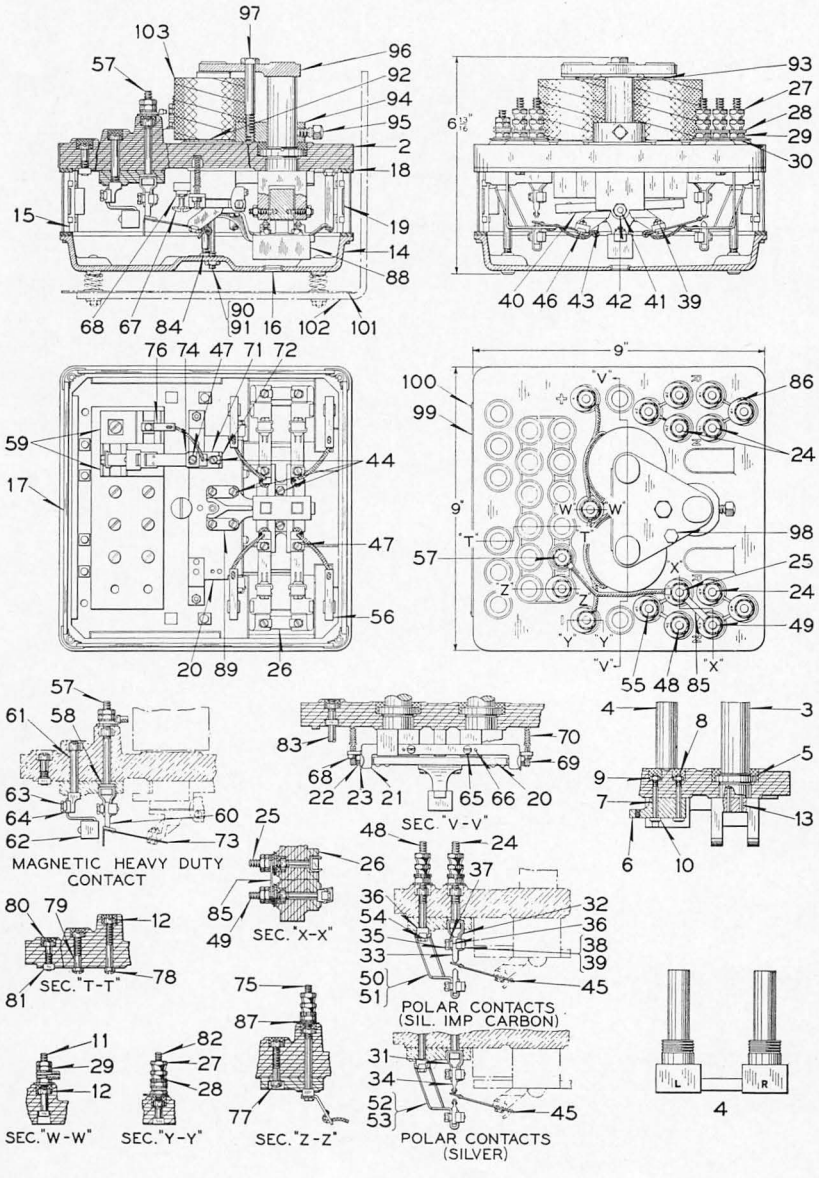
Six Point Styles "DP-20" and "DP-21" Retained Neutral Polarized Relays

Detail Parts of Improved design of Relays (without Cap Screws in Main Cores).

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
188746	**90**	**Connector** without Flexible Connector	8064–795
184288	**91**	**Auxiliary Core** for "DP-21" Relay	8101–357
47290	**92**	**Connector**	8064–305
156580	**93**	**Stop Spring**	8385–2191
170966	**94**	**Contact Spring Support**	9968–1014
150113	**95**	**Contact Spring Support**	9968–849
150166	**96**	**Screw**	8098–550
168826	**97**	**Washer**	8078–1499
181483	**98**	**Washer,** $\frac{1}{16}$″ thick	8078–1499
181481	**98a**	**Washer,** $\frac{1}{8}$″ thick	8078–1499
180392	**99**	**Name Plate** for 6 Pt. 4N-4R "DP-20" Relay	8225–433
188762	**99a**	**Name Plate** for 6 Pt. 4N-4R "DP-21" Relay	8225–377
	100	**Screw,** No. 4x$\frac{5}{16}$″ Rd. Hd. Hardened (Tin Pl.)	
184680	**101**	**Coil Lock**	8735–784
184902	**102**	**Washer** (Spacer)	7828–379
193420	**103**	**Backstrap Bracket**	8231–74
199199	**104**	**Cap Screw**	8099–232
206460	**105**	**R.H. Back Post with Silver Imp. Carbon Tip** (Inc. 1-68a, 1-71 and 1-107)	8094–2271
206461	**106**	**L.H. Back Post with Silver Imp. Carbon Tip** (Inc. 1-69a, 1-71 and 1-107)	8094–2271
100769	**107**	**Contact Tip, Silver Imp. Carbon**	8341–518
	108	**Contact Spring with Flexible Connector**	8385–2336
180856	**109**	**Shelf Type Shock Absorber Base Complete** (Similar to Ref. E, Plate E-5030, dimensions W-8″, X-7″, Y-9½″ and Z-8½″)	12404–27
180857	**110**	**Wall Type Shock Absorber Base Complete** (Similar to Ref. F, Plate E-5030, dimension V-8″)	12404–28
184289	**111**	**Hold Down Pole Piece**	8250–100



Style "DP-25" Polarized Relay

(With No Extra Neutral Contacts)

Style "DP-25" Polarized Relays

(With No Extra Neutral Contacts)

Detail Parts

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
211570	**2**	**Top Plate** without Cores	C–9271–4
211572	**3**	**Permanent Magnet Core Complete**	8101–338
	4	**Pair of Main Cores.** (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	C–9271–8
104169	**5**	**Nut**	8265–359
157231	**6**	**Core Pin Bracket**	8303–106
	7	**Core Pin,** Ref. 7a, with Nut Ref. 9 and Lock Washer Ref. 10	8114–717
157228	**7a**	**Core Pin Only**	8114–717
	8	**Screw,** Ref. 8a, with Nut Ref. 9 and Lock Washer Ref. 10	8098–1300
157230	**8a**	**Screw Only**	8098–1300
28166	**9**	**Nut** for Refs. 7 and 8	8109–192
149339	**10**	**Lock Washer** for Refs. 7, 8 and 67	8486–368
	11	**Terminal Post** with Nuts and Washers (Inc. 1-11a, 1-12, 2-28, 3-29 and 1-30)	12451–
115706	**11a**	**Terminal Post Only**	8094–1192
72948	**12**	**Nut**	8109–383
37789	**13**	**Pin**	8097–279
163293	**14**	**Base Complete** (Inc. 1-14a, 4-17, 1-18 and 4-19)	C–9278–2
163291	**14a**	**Base Complete** (Inc. 4-15 and 1-16)	C–9278–2
157224	**15**	**Stud**	8114–632
34340	**16**	**Ventilator**	C–7459–6
163294	**17**	**Glass** (Sides and ends)	8163–294
159483	**18**	**Gasket**	8078–1470

Style "DP-25" Polarized Relays

(With No Extra Neutral Contacts)

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
142653	**19**	**Shield Support**	10932–29
232038	**20**	**Armature** with Bracket, Pivot Screws and Lock Washers (Inc. 1-20a, 1-21, 2-22 and 2-23)	C–9271–9
232037	**20a**	**Armature**	8157–492
157243	**21**	**Bracket**	8303–107
164165	**22**	**Pivot Screw**	8378–356
159815	**23**	**Lock Washer**	8486–395
	24	**Terminal Post** with Nuts and Washers (Inc. 1-24a, 1-12, 2-27, 3-28, 1-29 and 1-30)	12451–
112417	**24a**	**Terminal Post Only**	8094–1192
	25	**Terminal Post** with Nuts and Washers (Inc. 1-25a, 1-12, 2-28, 2-29 and 1-30)	12451–
130593	**25a**	**Terminal Post Only**	8094–1192
157218	**26**	**Insulation Block**	8750–2348
29101	**27**	**Nut**	8109–193
29102	**28**	**Washer**	7828–139
29103	**29**	**Nut**	8109–194
69705	**30**	**Washer**	7828–287
131245	**31**	**Terminal Post** (Front Contact Holder)	8094–2122
134400	**32**	**Nut Lock**	8486–371
158043	**33**	**Contact Tip** (Sil. Imp. Carbon)	8341–476
159125	**34**	**Contact Tip** (Silver)	8094–2240
	35	**Screw** with Nut and Washers (Inc. 1-35a, 1-36, 1-37, 1-38 and 1-39)	12471–
57996	**35a**	**Screw Only**	8098–845
134516	**36**	**Bolt Lock**	8486–368

Style "DP-25" Polarized Relays

(With No Extra Neutral Contacts)

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
20686	**37**	**Washer**	7828–108
173737	**38**	**Nut Lock**	8486–403
151836	**39**	**Nut**	8109–445
106406	**40**	**Polar Armature** with Core Pins and Bushings	8157–374
157854	**41**	**Trunnion Screw**	8378–353
26545	**42**	**Nut**	8109–181
150113	**43**	**Contact Spring Support**	9968–849
142673	**44**	**Screw**	8098–1300
	45	**Contact Spring** with Flexible Connector	8385–2336
150140	**46**	**Bolt Lock**	8486–367
	47	**Screw** with Lock Washer and Nut (Inc. 1-47a, 1-36 and 1-39)	12471–
150166	**47a**	**Screw Only**	8098–550
	48	**Terminal Post** with Nuts, Washers and Screw (Inc. 1-48a, 1-12, 2-27, 3-28, 1-29, 1-30, 1-36 and 1-54)	12451–
157858	**48a**	**Terminal Post Only**	8094–2235
	49	**Terminal Post** with Nuts, Washers and Screw (Inc. 1-49a, 1-12, 2-28, 2-29, 1-30, 1-36 and 1-54)	12451–
195234	**49a**	**Terminal Post Only**	8094–2235
165540	**50**	**R. H. Back Post Complete** (Sil. Imp. Carbon Tip) (Inc. 1-50a, 1-33 and 1-35)	8094–2271
159558	**50a**	**R. H. Back Post Only** for Refs. 50 and 52	8094–2233
167528	**51**	**L. H. Back Post Complete** (Sil. Imp. Carbon Tip) (Inc. 1-51a, 1-33 and 1-35)	8094–2271
159559	**51a**	**L. H. Back Post Only** for Refs. 51 and 53	8094–2233
167527	**52**	**R. H. Back Post Complete** (Silver Tip) (Inc. 1-50a, 1-34 and 1-35)	8094–2271

Style "DP-25" Polarized Relays

(With No Extra Neutral Contacts)

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
165539	**53**	**L. H. Back Post Complete** (Silver Tip) (Inc. 1-51a, 1-34 and 1-35)	8094–2271
62977	**54**	**Screw**	8098–845
	55	**Terminal Post** with Nuts and Washers (Inc. 1-55a, 1-12, 2-27, 3-28, 1-29, 1-30, 1-36 and 1-54)	12451–
158035	**55a**	**Terminal Post Only**	8094–2125
163331	**56**	**Connector** (Without Flexible Connector)	8064–692
	57	**Terminal Post** with Nuts and Washers (Inc. 1-57a, 1-12, 1-28, 2-29, 1-30 and 1-58)	12451–
131237	**57a**	**Terminal Post Only**	8094–1192
52335	**58**	**Washer**	7828–184
161270	**59**	**Insulation Block**	8750–2348
106290	**60**	**Contact Tip** (Sil. Imp. Carbon)	8341–242
	61	**Terminal Post** with Nut, Lock Washers and Screw (Inc. 1-61a, 1-12, 1-36, 1-63 and 1-64)	12451–
233319	**61a**	**Terminal Post Only**	8094–2447
233521	**62**	**Magnetic Blow-Out Assembly Complete**	8094–2448
131239	**63**	**Screw**	8098–845
233321	**64**	**Bolt Lock**	8486–433
	65	**Machine Screw,** No. 8-36x½" Fil. Hd. Br. (N. P.).	
57497	**66**	**Pin**	8097–872
	67	**Stop Screw** with Nut and Lock Washer (Inc. 1-67a, 1-10 and 1-68)	12471–
149076	**67a**	**Stop Screw Only**	8098–549
1506	**68**	**Nut**	8109–12
	69	**Stud** with Nut (Inc. 1-69a and 1-68)	12471–
196408	**69a**	**Stud Only**	8098–1411

Style "DP-25" Polarized Relays

(With No Extra Neutral Contacts)

Detail Parts

(**Continued**)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
135953	**70**	**Coil Spring**	8124–260
141189	**71**	**Contact Spring Support**	9968–702
155340	**72**	**Bolt Lock**	8486–368
	73	**Contact Spring** with Flexible Connector	8385–2746
131258	**74**	**Bolt Lock**	8486–367
	75	**Terminal Post** with Nuts and Washers (Inc. 1-75a, 1-12, 2-27, 3-28, 1-30, 1-36 and 1-54)	12451–
157863	**75a**	**Terminal Post Only**	8094–2125
232039	**76**	**Connector** without Flexible Connector	8244–151
	77	**Machine Screw,** No. 14-24x1¼" Fil. Hd. S. with Nut Ref. 12.	
	78	**Machine Screw,** No. 14-24x1⅝" Fil. Hd. S. with Nut Ref. 12.	
	79	**Machine Screw,** No. 14-24x1 3/16" Fil. Hd. S. with Nut Ref. 12.	
	80	**Machine Screw,** No. 14-24x¾" Fil. Hd. S. with Nut Ref. 81.	
410442	**81**	**Nut.**	
	82	**Terminal Post** with Nuts and Washers (Inc. 1-82a, 1-12, 2-27, 4-28, 2-29 and 1-30)	12451–
130200	**82a**	**Terminal Post Only**	8094–1192
	83	**Center Post** with Nuts (Inc. 1-83a, 1-12 and 1-84)	12471–
158034	**83a**	**Center Post Only**	8098–876
138218	**84**	**Nut**	8265–252
47289	**85**	**Connector**	8064–304
142777	**86**	**Tag** (Orders should specify marking desired)	8988–75

Style "DP-25" Polarized Relays

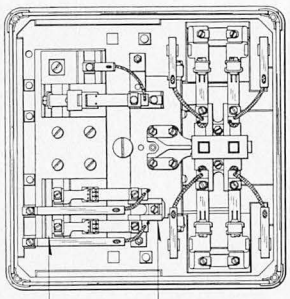
(With No Extra Neutral Contacts)

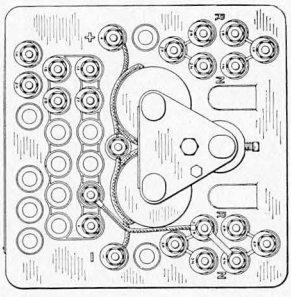
Detail Parts

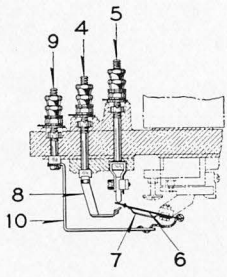
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
107232	**87**	**Tag,** Red (Orders should specify marking desired)	8988–53
216802	**88**	**Counterweight Complete**	C–9406–1
138073	**89**	**Bolt Lock**	8486–155
	90	**Screw,** Ref. 90a, with Nut Ref. 91. To hold contacts in place during shipping	12471–
142642	**90a**	**Screw Only**	8098–1298
537	**91**	**Nut**	8109–1
168826	**92**	**Washer**	8078–1499
184680	**93**	**Coil Lock**	8735–784
193420	**94**	**Back Strap Bracket**	8231–74
	95	**Set Screw,** $\frac{5}{16}$″-18x$\frac{1}{2}$″ Sq. Hd. Cup Point.	
194251	**96**	**Back Strap**	8162–262
	97	**Cap Screw,** $\frac{5}{16}$″-18x2$\frac{1}{4}$″ Hex. Hd. S.	
137935	**98**	**Screw.** To replace Ref. 90 when Relay is placed in service	8098–1289
232032	**99**	**Name Plate**	8225–614
	100	**Screw,** No. 4-40x$\frac{1}{4}$″ Rd. Hd. (C.N. 52620).	
172595	**101**	**Shelf Type Shock Absorber Base Complete.** For details see Ref. Ef, Plate E-5030	12404–27
173298	**102**	**Wall Type Shock Absorber Base Complete.** For details see Ref. Ff, Plate E-5030	12404–44
216782	**103**	**Magnet Coil** (55-Ohms)	8133–410
223187	**103a**	**Magnet Coil** (140-Ohms)	8133–410
222423	**103b**	**Magnet Coil** (225-Ohms)	8133–410
222422	**103c**	**Magnet Coil** (350-Ohms)	8133–410
216780	**103d**	**Magnet Coil** (500-Ohms)	8133–410







L.V. NEUTRAL CONTACTS

FOR ALL OTHER DETAILS
REFER TO PLATE E-5172

Style "DP-25" Polarized Relay

(With Two Extra Neutral Contacts)

Style "DP-25" Polarized Relays

(With Two Extra Neutral Contacts)

Detail Parts

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
157218	**2**	**Insulation Block**	8750–2348
150113	**3**	**Contact Spring Support**	9968–849
	4	**Terminal Post** with Nuts, Washers and Screw (Inc. 1-4a of this Plate and 1-12, 2-27, 3-28, 1-29, 1-30, 1-36 and 1-54 of Plate E-5172)	12451–
219933	**4a**	**Terminal Post Only**	8094–2125
	5	**Terminal Post** with Nuts and Washers (Inc. 1-5a of this Plate and 1-12, 2-27, 3-28, 1-29 and 1-30 of Plate E-5172)	12451–
157862	**5a**	**Terminal Post Only**	8094–2207
180974	**6**	**Contact Spring** with Flexible Connector	8385–2336
180975	**7**	**Spring Stop**	8735–769
131261	**8**	**Back Post** with Silver Tip	8094–2123
	9	**Terminal Post** with Nuts, Washers and Screw (Inc. 1-9a of this Plate and 1-12, 2-27, 3-28, 1-29, 1-30, 1-36 and 1-54 of Plate E-5172)	12451–
131234	**9a**	**Terminal Post Only**	8094–2125
163329	**10**	**Connector** without Flexible Connector	8064–691

Section
E

Relays, Indicators and Electric Locks

Plates E-5201, E-5206 and E-5210

Style "DT-10" Time Element Relay

(Revised May, 1931; Supersedes Issue of April, 1930)

Union Switch & Signal Co.
Swissvale, Pa.

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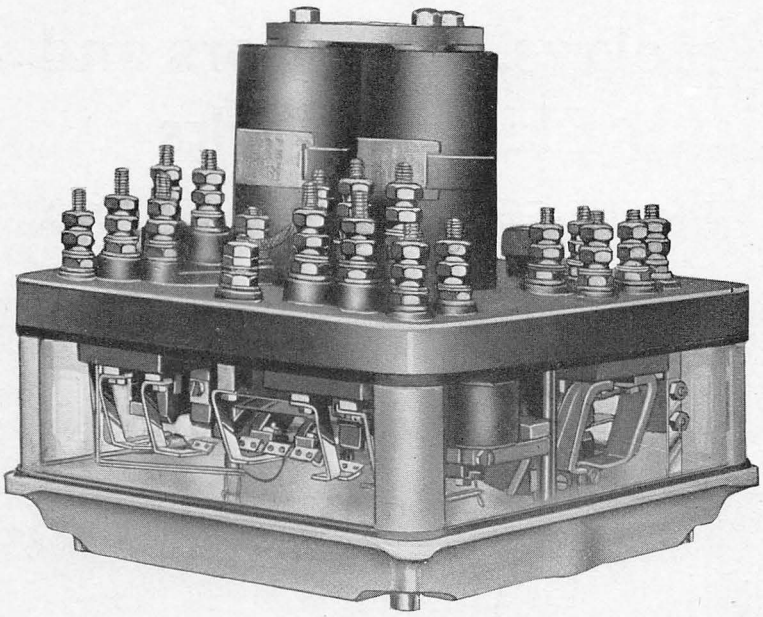
May, 1931



STYLE "DT-10" TIME ELEMENT RELAY

The Style "DT-10" is an oscillating time element relay using a ratchet and pawl arrangement to close a contact through a train of gears, which can be engaged or released by means of a clutch. Flasher contacts can be furnished on the 0.5 to 6 minute relay which operates from 30 to 35 flashes a minute. The 10 to 120 second relay, which is designed for greater precision in timing, operates at a higher frequency and is not suitable for operation of flasher circuits.

The neutral contacts of this relay are designed for a continuous low voltage d-c. carrying capacity of 3 amperes and intermittent capacity of 5 amperes for 30 seconds; the flasher contacts will safely make and break a low voltage d-c. current of 4 amperes; the checking contact due to its slow break away should not control high voltage circuits at all nor low voltage circuits carrying in excess of 0.5 ampere. Shock absorbing springs are standard equipment for all shelf and wall mounted Style "DT-10" Relays. See bulletin 138 for detail information.

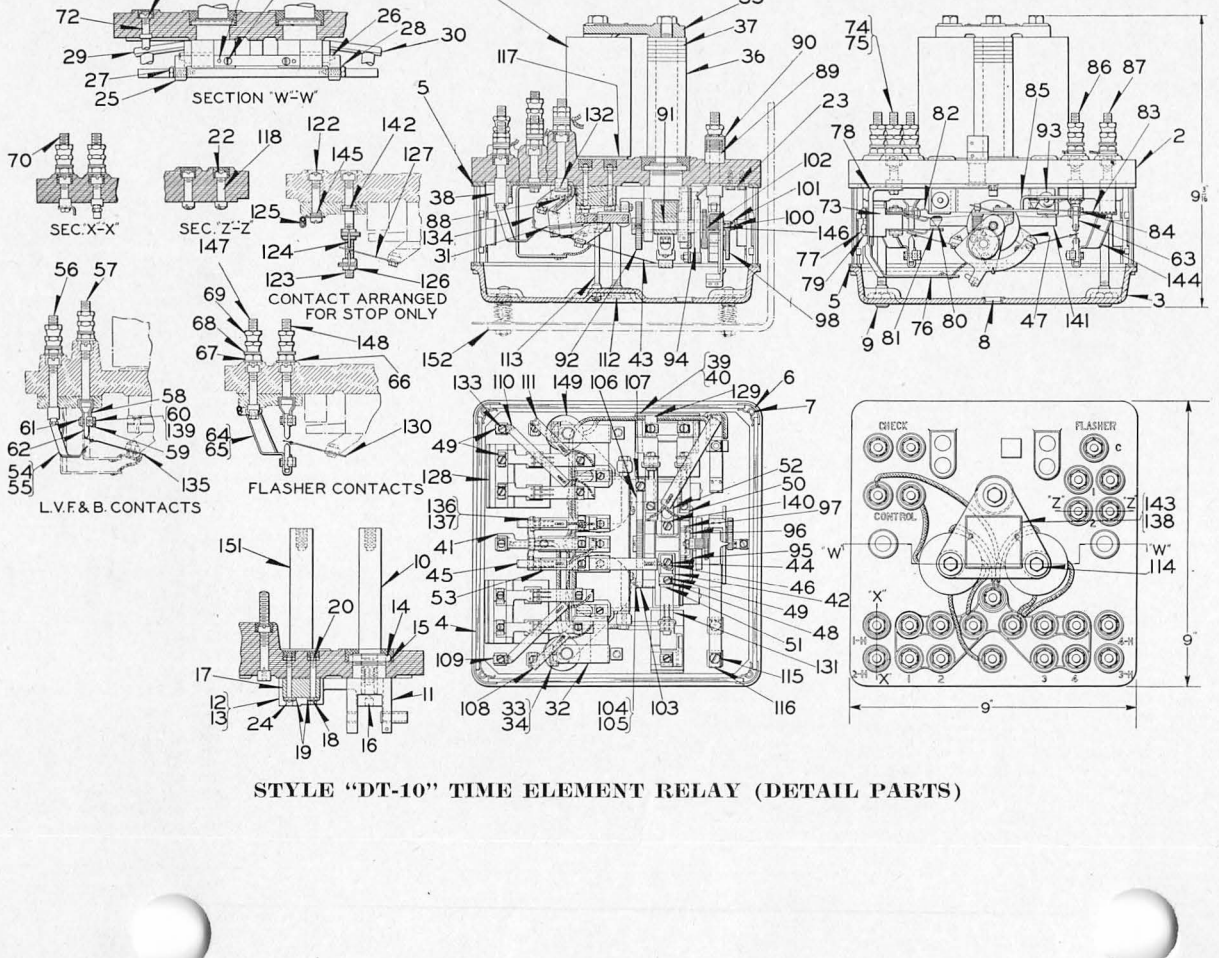
UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAYS

Silver to silver impregnated graphite front and silver to silver back neutral contacts will be supplied unless otherwise specified.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
160333	*A	**Style "DT-10" (Shelf Type) D.C. Time Element Relay,** for 10 volt operation, time interval 0.5 to 6 minutes, equipped with four front and four back low voltage non-independent contacts and 1 checking contact	C–9277–1
	*Aa	**Style "DT-10" (Shelf Type) D.C. Time Element Relay,** for 10 volt operation, time interval 10 to 120 seconds, equipped with four front and four back low voltage non-independent contacts and 1 checking contact	C–9277–1
	*Ab	**Style "DT-10" (Shelf Type) D.C. Time Element Relay,** for 10 volt operation, time interval 0.5 to 6 minutes, equipped with four front and four back low voltage non-independent contacts, 1 checking contact and two normal and two reverse non-independent flasher contacts	C–9277–1
	*Ac	**Style "DT-10" (Wall Type) D.C. Time Element Relay,** for 10 volt operation, time interval 0.5 to 6 minutes, equipped with four front and four back low voltage non-independent contacts and 1 checking contact	C–9277–1
	*Ad	**Style "DT-10" (Wall Type) D.C. Time Element Relay,** for 10 volt operation, time interval 10 to 120 seconds, equipped with four front and four back low voltage non-independent contacts and 1 checking contact	C–9277–1
	*Ae	**Style "DT-10" (Wall Type) D.C. Time Element Relay,** for 10 volt operation, time interval 0.5 to 6 minutes, equipped with four front and four back low voltage non-independent contacts, 1 checking contact and two normal and two reverse non-independent flasher contacts	C–9277–1
		*If specified this relay may be furnished for operating voltages of 6, 8, 12 or 14 volts.	



STYLE "DT-10" TIME ELEMENT RELAY (DETAIL PARTS)

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
159324	**2**	**Top Plate only,** (Without Cores)	C–9278–1
159484	**3**	**Base Plate with Glass Shields, Gasket, Shield Support, Corner Posts, Studs and Ventilator** (Inc. 1-3a, 4-4, 1-5, 4-6, 4-7, 1-8 and 4-9)	C–9278–2
159381	**3a**	**Base Plate only,** for Ref. 3	C–9278–2
159463	**4**	**Glass Shield** (Side and End)	8163–294
159483	**5**	**Gasket**	8078–1470
159461	**6**	**Shield Support**	10932–29
159380	**7**	**Corner Post**	8114–632
34340	**8**	**Ventilator**	C–7459–6
145116	**9**	**Stud**	8114–631
157232	**10**	**Core**	8101–337
160332	**11**	**Yoke**	8101–342
160331	**11a**	**Magnet Core** with Core Ref. 10 and Bushings	8101–342
160838	**12**	**R. H. Pole Piece**	8250–85
167576	**12a**	**R. H. Pole Piece** with Core Ref. 151	8250–85
160837	**13**	**L. H. Pole Piece**	8250–85
167577	**13a**	**L. H. Pole Piece** with Core Ref. 151	8250–85
131210	**14**	**Nut**	8109–426
74816	**15**	**Washer**	8274–99
157229	**16**	**Core Pin**	8097–973

PLATE E-5206

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
160334	**17**	**Armature Bracket**	8303–109
157230	**18**	**Screw**	8098–1300
149339	**19**	**Lock Washer** for Ref. 18	8486–368
28166	**20**	**Nut** for Ref. 18	8109–192
	21	**Terminal Post with Nuts** for fastening Wall Bracket to Top Plate (Inc. 1-21a, 1-22, 1-66 and 2-67) (Not shown)	12451–
117515	**21a**	**Terminal Post only,** for Ref. 21	8094–1192
72948	**22**	**Nut**	8109–383
166299	**23**	**Clutch Armature Stop**	11893–482
157228	**24**	**Core Pin**	8114–717
161186	**25**	**Armature with Bracket, Pivot, Screws and Lock Washers** (Inc. 1-26 and 2-27)	C–9278–3
159675	**25a**	**Armature only,** for Ref. 25	8157–369
157243	**26**	**Bracket**	8303–107
159814	**27**	**Pivot Screw**	8378–354
159815	**28**	**Lock Washer,** for Ref. 27	8486–395
160359	29	**R. H. Magnet Bracket** complete with core	8075–221
160361	**30**	**L. H. Magnet Bracket** complete with core	8075–221
135649	**31**	**Washer**	8078–1042
160357	**32**	**Pole Piece**	8250–84
161271	**33**	**Screw** for Ref. 32	8098–1300

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
149339	**34**	**Lock Washer** for Ref. 33	8486–368
161192	**35**	**Back Strap** with Name Plate	8162–233
161191	**35a**	**Back Strap only**	8162–233
161193	**36**	**Copper Tube**	8161–118
164948	**36a**	**Brass Tube**	8161–118
161195	**37**	**Washer**	7828–176
	38	**Terminal Post with Nuts, Washers and Screw for Back Post** (Inc. 1-38a, 1-22, 1-41, 1-66, 3-67 and 2-68)	12451–
160746	**38a**	**Terminal Post only,** for Ref. 38	8094–2242
157218	**39**	**Insulating Block** (when Flasher Contacts are used)	8750–2348
161270	**40**	**Insulating Block** (when no Flasher Contacts are used)	8750–2348
159809	**41**	**Back Post**	8094–2239
141189	**42**	**Contact Spring Support**	9968–702
161088	**43**	**Connector**	8064–684
142673	**44**	**Screw**	8098–1300
161086	**45**	**Connector**	8064–683
155340	**46**	**Lock Washer**	8486–368
151836	**47**	**Nut**	8109–445
150166	**48**	**Screw**	8098–550

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
134516	**49**	**Lock Washer**	8486–368
150140	**50**	**Lock Washer**	8486–367
131258	**51**	**Lock Washer**	8486–367
150113	**52**	**Contact Spring Support**	9968–849
170726	**53**	**Contact Spring** with Flexible Connector	8385–1996
131261	**54**	**L. H. Back Post** (Silver Contact Tip)	8094–2123
157394	**54a**	**L. H. Back Post** (Sil. Imp. Graph. Contact Tip)	8094–2234
131262	**55**	**R. H. Back Post** (Silver Contact Tip)	8094–2123
157395	**55a**	**R. H. Back Post** (Sil. Imp. Graph. Contact Tip)	8094–2234
	56	**Terminal Post** with Nuts, Washers, Lock Washer and Screw (Inc. 1-56a, 1-66, 1-67, 2-68, 2-69, 1-22, 1-49 and 1-88)	12451–
160845	**56a**	**Terminal Post only,** for Ref. 56	8094–2125
	57	**Terminal Post** with Nuts and Washers (Inc. 1-57a, 1-66, 1-67, 2-68, 2-69 and 1-22)	12451–
157862	**57a**	**Terminal Post only,** for Ref. 57	8094–2207
131245	**58**	**Terminal Post**	8094–2122
134400	**59**	**Lock Washer**	8486–371
151836	**60**	**Nut,** used with Ref. 139	8109–445
57996	**61**	**Screw**	8098–845
158043	**62**	**Contact Tip (Silver Imp. Graphite)**	8341–476

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
159125	**63**	**Contact Tip**	8094–2240
167528	**64**	**L. H. Back Post** (With Contact Tip) (Sil. Imp. Graph.)	8094–2271
165540	**65**	**R. H. Back Post** (With Contact Tip) (Sil. Imp. Graph.)	8094–2271
69705	**66**	**Washer**	7828–287
29103	**67**	**Nut**	8109–194
29102	**68**	**Washer**	7828–139
29101	**69**	**Nut**	8109–193
	70	**Terminal Post** with Nuts and Washers (Inc. 1-70a, 1-66, 1-67, 2-68, 2-69 and 1-22)	12451–
158035	**70a**	**Terminal Post only,** for Ref. 70	8094–2125
73772	**71**	**Washer**	7826–180
	72	**Screw with Nut and Washer** (Inc. 1-72a, 1-22 and 1-71)	12471–
161072	**72a**	**Screw only,** for Ref. 72	8098–876
62135	**73**	**Contact Block**	9968–397
167081	**73a**	**Contact Block** with Contact Springs	8385–2260
	74	**Terminal Post** with Nuts, Washers and Screw (Inc. 1-74a, 1-66, 1-67, 2-68, 2-69, 1-22, 1-49 and 1-88) (used when Flasher Contacts are required)	12451–
160944	**74a**	**Terminal Post only,** for Ref. 74	8094–2247
	75	**Terminal Post with Nuts and Washers** (Inc. 1-75a and 1-22) used when no Flasher Contacts are required	12451–

PLATE E-5206

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
161197	**75a**	**Terminal Post only,** for Ref. 75	8094–2247
161821	**76**	**Terminal Connector** (used when Flasher Contacts are required)	8064–687
1515	**77**	**Nut**	8109–23
160337	**78**	**Bracket**	12538–47
74798	**79**	**Lock Washer** for Ref. 77	8486–55
160363	**80**	**Contact Spring**	8385–2218
160368	**81**	**Contact Spring**	8385–2217
160739	**82**	**Contact Spring Stop**	8735-688
161199	**83**	**Contact Spring**	8385–2225
160740	**84**	**Contact Spring Stop**	8735–688
160741	**85**	**Contact Spring Stop**	8735–689
	86	**Terminal Post with Nuts and Washers** (Inc. 1-86a, 1-67, 3-68, 2-69, 1-66 and 1-22)	12451–
160353	**86a**	**Terminal Post only,** for Ref. 86	8094–2246
167124	**86b**	**Terminal Post with Contact Springs and Stops** (Inc. 1-86a, 1-80, 1-85, 1-82, 1-115 and 1-140)	8094–2279
	87	**Terminal Post with Nuts and Washers** (Inc. 1-87a, 1-66, 1-67, 3-68, 2-69 and 1-22)	12451–
160742	**87a**	**Terminal Post only,** for Ref. 87	8094–2246
167125	**87b**	**Terminal Post with Contact Springs and Stops** (Inc. 1-87a, 1-83, 1-84, 1-115 and 1-140)	8094–2280

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
131239	**88**	**Screw**	8098–845
159676	**89**	**Bushing**	8350–778
159677	**90**	**Nut**	8109–453
160749	**91**	**Armature Shaft**	12501–46
160738	**92**	**Ratchet Wheel**	9121–136
160365	**93**	**Oscillating Armature** (Used with Flasher Contacts)	8157–370
160943	**93a**	**Oscillating Armature** with Pins (Used without Flasher Contacts)	8157–370
160836	**94**	**Brake Wheel**	8424–258
160744	**95**	**Brake Armature**	8157–371
161194	**96**	**Washer**	8112–66
161189	**97**	**Pin**	8097–852
	98	**Planetary Gear Train** complete (for details refer to Plate E-5210)	C–9278–4
57497	**99**	**Dowel Pin** for Ref. 25	8097–872
160844	**100**	**Pinion Gear** (For 0.5 to 6 Minute Operation)	8424–259
162000	**100a**	**Pinion Gear** (For 10 to 120 Second Operation)	8424–260
156495	**101**	**Pin** for Pinion	8097–409
83	**102**	**Washer**	7828–3
160369	**103**	**Pawl**	9121–135
18120	**104**	**Washer** for Ref. 105	7828–100

PLATE E-5206

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
156497	**105**	**Pin**	8097–409
166261	**106**	**Spring**	8735–690
62977	**107**	**Screw**	8098–845
158139	**108**	**L. H. Connector**	8064–674
158143	**109**	**L. H. Connector**	8064–675
158145	**110**	**R. H. Connector**	8064–675
158141	**111**	**R. H. Connector**	8064–674
138218	**112**	**Nut**	8265–252
161187	**113**	**Screw** with Nut Ref. 113b (used for shipping)	8098–1298
137935	**113a**	**Screw** (used in place of Ref. 113 when installed)	8098–1289
537	**113b**	**Nut** for Ref. 113	8109–1
	114	**Cap Screw,** $\frac{5}{16}$**"-18x**$\frac{3}{4}$**"** Hex. Hd. S. (Cad. Pl.).	
48554	**115**	**Screw**	8098–464
140852	**116**	**Nut Lock**	8486–403
168824	**117**	**Washer** ($\frac{1}{8}$" Thick)	8078–1499
168826	**117a**	**Washer** ($\frac{1}{16}$" Thick)	8078–1499
	118	**Machine Screw No. 14-24x1"** (Cad. Pl.) with Nut Ref. 22.	
163194	**119**	**Wall Bracket** (Not shown)	11893–475
	120	**Machine Screw No. 8-36x**$\frac{1}{2}$**"** Fil. Hd. Br. (N. P.) for Ref. 25.	
410218	**121**	**Shock Absorber Spring** (Not shown).	

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	122	**Screw** with Nut and Washer (Inc. 1-122a, 1-22, 1-125 and 3-145)	12471–
161184	**122a**	**Screw only,** for Ref. 122	8098–589
	123	**Back Post** with Nuts, Washer and Lock Washer used when no Flasher Contacts are required (Inc. 1-123a, 1-22, 2-124, 2-125, 4-126 and 1-142)	12471–
161073	**123a**	**Back Post only,** for Ref. 123	8098–925
161089	**124**	**Stop**	11893–496
32814	**125**	**Lock Washer**	8486–133
30420	**126**	**Nut**	8109–214
161185	**127**	**Contact Spring** (Used when no Flasher Contacts are required)	8735–691
157218	**128**	**Insulation** (For Relay with Flasher Contacts)	8750–2348
161270	**128a**	**Insulation** (used in Space No. 1) (For Relay without Flasher Contacts)	8750–2348
56212	**129**	**Lead Clip**	8486–155
170726	**130**	**Contact Spring** with Flexible Connector for Flasher (With Silver Contact Tip)	8385–1996
176829	**131**	**Contact Spring** with Flexible Connector for Control Contact only	8385–2253
135300	**132**	**Lock Washer**	8486–374
131239	**133**	**Screw**	8098–845
162002	**134**	**Contact Post**	8094–2259

UNION SWITCH & SIGNAL CO.

STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
170726	**135**	**Contact Spring** with Flexible Connector	8385–1996
176828	**136**	**Contact Spring** with Flexible Connector	8385–1996
156580	**137**	**Reinforcing Spring** for Ref. 136	8385–2191
161190	**138**	**Name Plate**	8225–344
173737	**139**	**Nut Lock**	8486–403
149339	**140**	**Lock Washer**	8486–368
160943	**141**	**Polar Armature** with Pins and Rivets	8157–370
52010	**142**	**Lock Washer**	8486–267
	143	**Screw, No. 4x$\frac{3}{16}$"** (Cad. Pl.).	
165539	**144**	**Back Post**	8094–2271
18757	**145**	**Washer**	7828–104
87225	**146**	**Washer**	7828–287
170910	**147**	**Terminal Post** with Nuts, Washers and Screw (Inc. 1-147a, 1-22, 1-49, 1-66, 1-67, 2-68, 2-69 and 1-88)	12451–239
157858	**147a**	**Terminal Post only,** for Ref. 147	8094–2235
170911	**148**	**Terminal Post** with Nuts and Washers (Inc. 1-148a, 1-22, 1-66, 1-67, 2-68 and 2-69)	12451–241
112417	**148a**	**Terminal Post only,** for Ref. 148	8094–1192
161275	**149**	**Neutralizing Coils,** 11-Ohms per pair (For 6-Volt Relay)	8133–395

UNION SWITCH & SIGNAL CO.

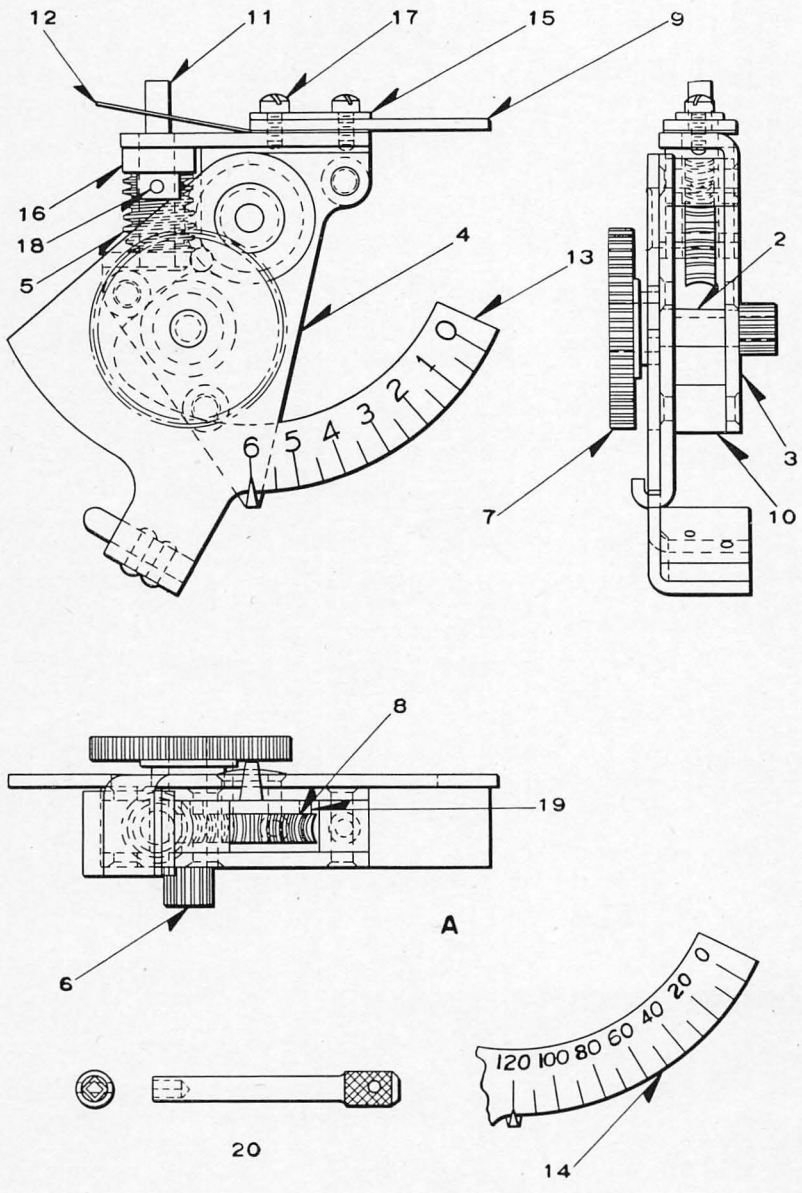
STYLE "DT-10" D. C. TIME ELEMENT RELAY
DETAIL PARTS
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
168894	**149a**	**Neutralizing Coils,** 18-Ohms per pair (For 8-Volt Relay)	8133–395
168895	**149b**	**Neutralizing Coils,** 28-Ohms per pair (For 10-Volt Relay)	8133–395
168896	**149c**	**Neutralizing Coils,** 48-Ohms per pair (For 12-Volt Relay)	8133–395
161822	**150**	**Magnet Coil,** 100-Ohms (32.5 Ohms low resistance and 67.5 Ohms high resistance)	8133–394
160946	**150a**	**Magnet Coil,** 175-Ohms (50 Ohms low resistance and 125-Ohms high resistance)	8133–394
160948	**150b**	**Magnet Coil,** 275-Ohms (80 Ohms low resistance and 195 Ohms high resistance)	8133–394
160949	**150c**	**Magnet Coil,** 400-Ohms (125 Ohms low resistance and 275 Ohms high resistance)	8133–394
170818	**151**	**Core** for Refs. 12a and 13a	8101–347
173298	**152**	**Shock Absorber Springs,** for Wall mounting	12404–28
172595	**152a**	**Shock Absorber Springs,** for Shelf mounting	12404–27

PLATE E-5210

UNION SWITCH & SIGNAL CO.



PLANETARY GEAR TRAIN ASSEMBLY

UNION SWITCH & SIGNAL CO.

DETAILS "DT-10" D. C. TIME ELEMENT RELAY DETAIL PARTS
PLANETARY GEAR TRAIN ASSEMBLY

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
160354	**A**	**Planetary Gear Train** with Segment for 0.5 to 6 Minute Operation (For Style "DT-10" D.C. Time Element Relay)	C–9278–4
162007	**Aa**	**Planetary Gear Train** with Segment for 10 to 120 Second Operation (For Style "DT-10" D.C. Time Element Relay)	C–9278–4
160339	**2**	**Shaft**	12501–45
160340	**3**	**Plate**	12538–50
160342	**4**	**Plate**	12538–48
160343	**5**	**Worm Gear**	8424–254
160344	**6**	**Pinion** (For Ref. A)	8424–255
162003	**6a**	**Pinion** (For Ref. Aa)	8424–262
160345	**7**	**Spur Gear**	8424–256
160346	**8**	**Worm Gear**	8424–257
160348	**9**	**Insulation Strip**	8750–2366
160349	**10**	**Spacer**	8114–431
160350	**11**	**Shaft**	12501–44
160351	**12**	**Spring**	8735–686
160352	**13**	**Segment** for Ref. A (Graduated for 0.5 to 6 Minute Operation)	12538–49
	14	**Segment** for Ref. Aa (Graduated for 10 to 120 Second Operation)	12538–49

UNION SWITCH & SIGNAL CO.

DETAILS "DT-10" D. C. TIME ELEMENT RELAY DETAIL PARTS
PLANETARY GEAR TRAIN ASSEMBLY
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
152720	**15**	**Plate**	7828–275
160355	**16**	**Washer**	8112–66
	17	**Machine Screw No. 3-56x$\frac{3}{16}$″ Fil. Hd. Br.**	
73147	**18**	**Pin**	8097–872
2992	**19**	**Washer**	8112–77
160336	**20**	**Adjustment Wrench**	8802–92

Section
E

Relays, Indicators and Electric Locks
Plate E-5220

STYLE "TH" THERMAL RELAY

Union Switch & Signal Co.
Swissvale, Pa.

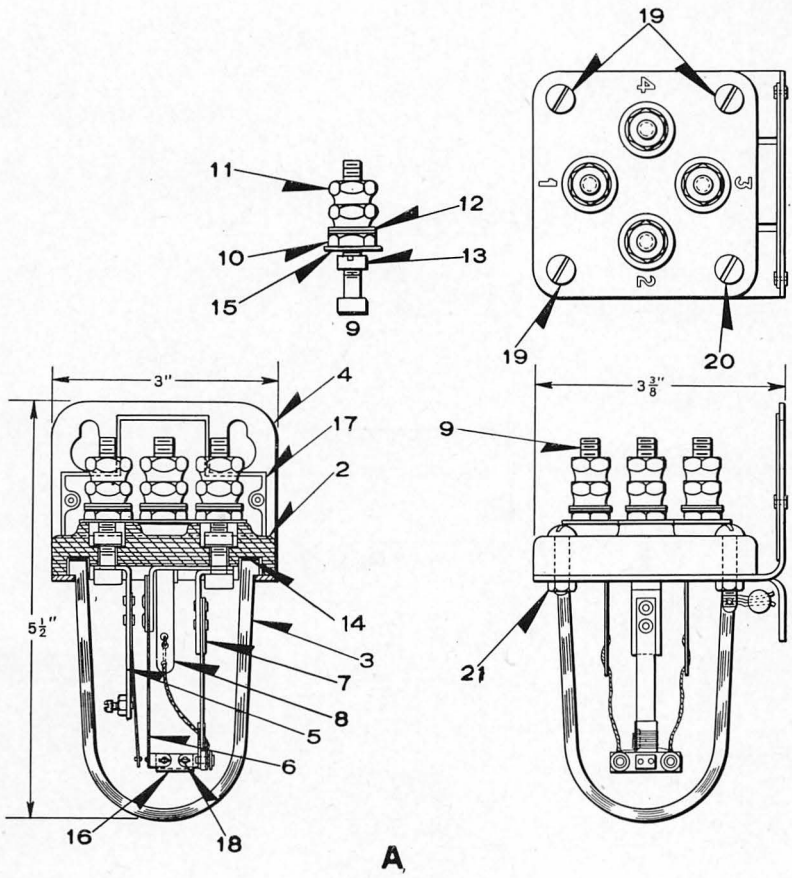
Printed in U. S. A.

April, 1930

Remove Staple Before Filing Pages in Loose Leaf Cover

PLATE E-5220

UNION SWITCH & SIGNAL CO.



STYLE "TH" THERMAL RELAY

The Style "TH" thermal relay is small, compact and enclosed. It can be used for wall or shelf mounting, the same bracket being used for either. The top plate is of moulded bakelite, and has mounted on it four A. R. A. terminals. The standard relay is furnished for 10 volt (a-c. or d-c.) 10 second operation, but other operating voltages and time intervals can be furnished when desired. The contact will carry one ampere. Further information may be found in bulletin 137.

UNION SWITCH & SIGNAL CO.

STYLE "TH" THERMAL RELAY

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "TH" Thermal Relay Complete							
Piece	Ref.	Volts	Retard. Sec.	Ohms Res.	Heater Element Ref.	Remarks	Drawing Reference
160397	**A**	10	10	10	7		B–12662–2
160529	**Aa**	14	10	20	7a		B–12662–2
160530	**Ab**	4.5	13	2.5	7b		B–12662–2
162573	**Ac**	14	15	20	7c		B–12662–2
163114	**Ad**	14	5	20	7a		B–12662–2
163115	**Ae**	24	15	60	7d		B–12662–2
163665	**Af**	12	5	15	7e		B–12662–2
164016	**Ag**	8	5	6.5	7f		B–12662–2
164351	**Ah**	10	5	10	7		B–12662–2
164503	**Aj**	12	10	15	7e		B–12662–2

PLATE E-5220

UNION SWITCH & SIGNAL CO.

STYLE "TH" THERMAL RELAY

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
160122	**2**	**Top Plate**	9968–943
158990	**3**	**Glass Cover**	8163–98
160203	**4**	**Bracket**	10914–201
160275	**5**	**Contact Spring**	8385–2219
160277	**6**	**Contact Spring**	8385–2220
160526	**7**	**Heater Element** (10 Ohms. Res.) for Refs. A and Ah	9065–204
160527	**7a**	**Heater Element** (20 Ohms. Res.) for Refs. Aa and Ad.	9065–204
160528	**7b**	**Heater Element** (2.5 Ohms. Res.) for Ref. Ab	9065–204
162574	**7c**	**Heater Element** (20 Ohms. Res.) for Ref. Ac	9065–204
163116	**7d**	**Heater Element** (60 Ohms. Res.) for Ref. Ae	9065–204
163664	**7e**	**Heater Element** (15 Ohms. Res.) for Refs. Af and Aj	9065–204
164015	**7f**	**Heater Element** (10 Ohms. Res.) for Ref. Ag	9065–204
160378	**8**	**Terminal Connector**	8244–122
	9	**Terminal Post** with Nuts and Washers (Inc. 1-9a, 1-10, 2-11, 2-12, 1-13 and 1-15)	12451–
161725	**9a**	**Terminal Post only,** for Ref. 9	8094–2207
29103	**10**	**Nut**	8109–194
29101	**11**	**Nut**	8109–193
29102	**12**	**Washer**	7828–139

UNION SWITCH & SIGNAL CO.

STYLE "TH" THERMAL RELAY

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
72948	**13**	**Nut**	8109–383
164468	**14**	**Gasket**	8078–19
69705	**15**	**Washer**	7828–287
160230	**16**	**Link**	11893–488
160508	**17**	**Name Plate**	8225–342
65245	**18**	**Rivet** for Ref. 16	10301–21
	19	**Machine Screw No. 10-30x¾″** Rd. Hd. Br. with Nut Ref. 21	12471–
	20	**Screw** with Nut Ref. 21	12471–
160470	**20a**	**Screw only,** for Ref. 20	8098–919
26942	**21**	**Nut** for Refs. 19 and 20	8109–184

TH-10 Thermal Relay

PURPOSE

The TH-10 Thermal Relay provides a simple, adjustable time delay relay for effecting the release of approach or time locking, or for other applications involving time delay, when the time interval required for a complete operating cycle does not exceed the maximum time interval listed in the ordering references herewith. It has a back contact for checking the completion of its cycle.

CHARACTERISTICS

Power consumption: approximately 10 watts.

Energy source: either d-c. or a-c.

Contacts: one front and one back, independent silver to silver.

For timing ranges available, see ordering references.

The TH-10 relay has temperature compensation so as to greatly reduce the changes in the timing cycle which would otherwise occur with changes in ambient temperature. For a variation of 50° F. above or below a nominal room temperature of 70° F., when operated at rated voltage, or for a given temperature with voltage variation of plus or minus 10%, the relay timing will stay within 15% of its original adjustment.

The relay may be externally adjusted within its normal time range by the use of a small screw driver through a post which can then be lead-sealed. Another sealable post provides a shipping lock which can be engaged with the movable element for protection during transportation.

Although it is recommended that the heater coil be energized for only the rated front contact periods of time, the coil is physically capable of being energized continuously at rated voltage without appreciable change in thermal characteristics.

MOUNTING

The relay should be mounted vertically.

COVER

The relay is enclosed by a glass cover and sealed against dust and moisture.

CIRCUIT APPLICATION

While the following diagrams illustrate only two typical applications of the Union Style TH-10 Thermal Relay, this relay may be used in a number of signaling schemes where a time-delay relay is required.

The arrangement shown by Fig. 1 provides a long release time using the Complete Operating Cycle of a Thermal Relay in the release of Approach (or Time) Locking.

When the signal is placed at stop with the approach section occupied, signal repeating relay "RGPR" is picked up by a circuit which checks that the signals are at stop and also includes the checking contact of the thermal relay to insure that the time of a complete operating cycle of the thermal relay must elapse before the approach locking relay "ASR" can pick up. A stick circuit then holds relay "RGPR" picked up while the thermal relay is operating.

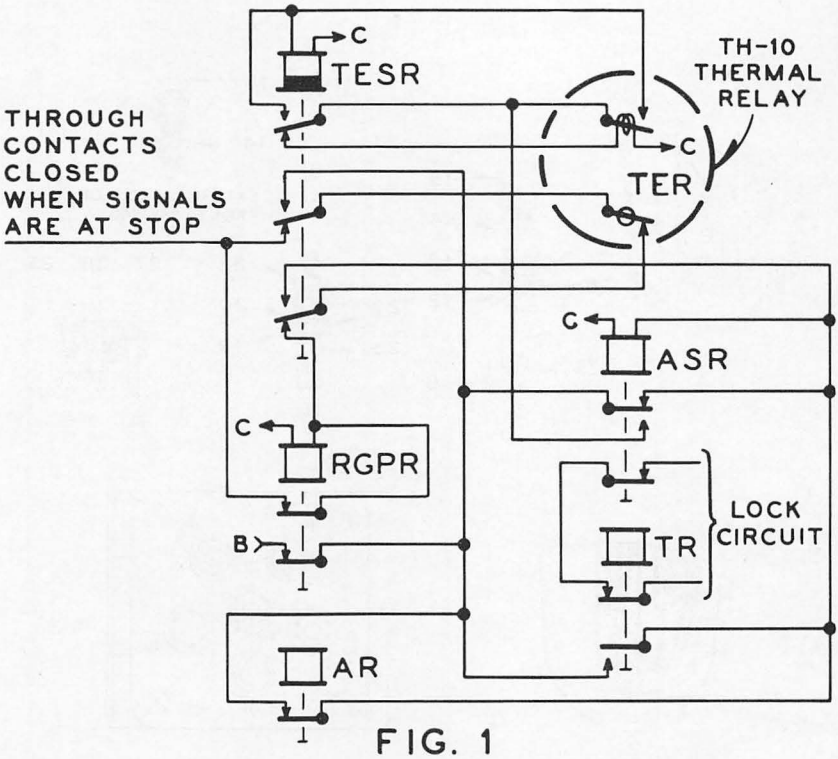
Relay "RGPR" picked up closes the heating circuit for thermal relay "TER". At the end of the heating time, the front contact of relay "TER" closes to energize relay "TESR" which in turn opens the heating circuit. A stick circuit holds relay "TESR" energized during the cooling time of thermal relay "TER", and when the checking contact on relay "TER" recloses at the end of this time, approach locking relay "ASR" is picked up to complete the "lock circuit" which permits switch operation. Relay "TESR" is de-energized when relay "ASR" picks up.

The arrangement illustrated by Fig. 2 provides a Short release time using the Front Contact Time only of a Thermal Relay in the release of Time Locking.

When the signal is placed at stop, the signal repeating relay "RGPR" is energized by a circuit which checks that the signals are at stop and includes the checking contact of the thermal relay to insure that the full heating time of thermal relay "TER" must elapse before the time locking relay "ASR" can pick up. A stick circuit then holds relay "RGPR" energized while the thermal relay is operating.

Relay "RGPR" picked up closes the heating circuit of Relay "TER". At the end of the heating time, the front contact of relay "TER" closes to energize relay "ASR" which in turn opens the heating circuit and at the same time completes the "lock circuit" which permits switch operation.

The thermal relay then cools and recloses its checking contact preparatory to the next operation. Should the signal be recleared at any time, relay "RGPR" will be released and must be reenergized through the checking contact of the thermal relay.


C
TESR
TH-10
THERMAL
RELAY
THROUGH
CONTACTS
CLOSED
WHEN SIGNALS
ARE AT STOP
C
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LOCK
CIRCUIT
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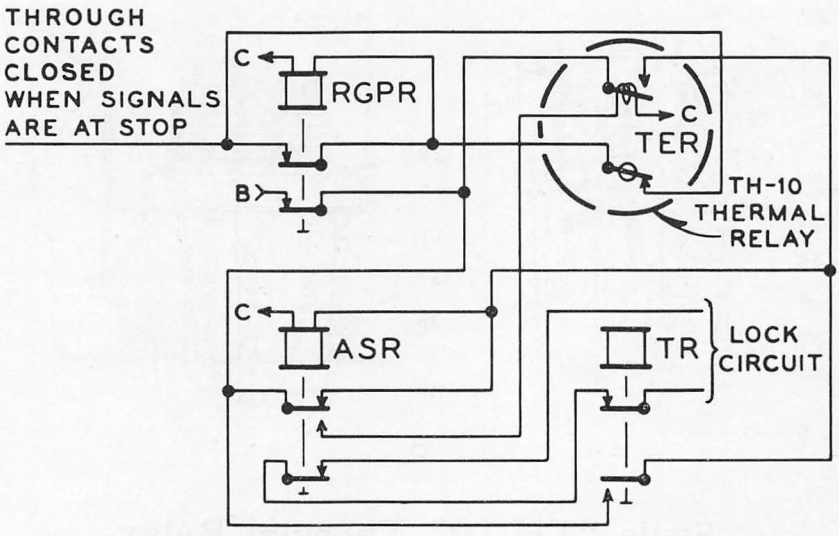
FIG. 1


THROUGH
CONTACTS
CLOSED
WHEN SIGNALS
ARE AT STOP
C
RGPR
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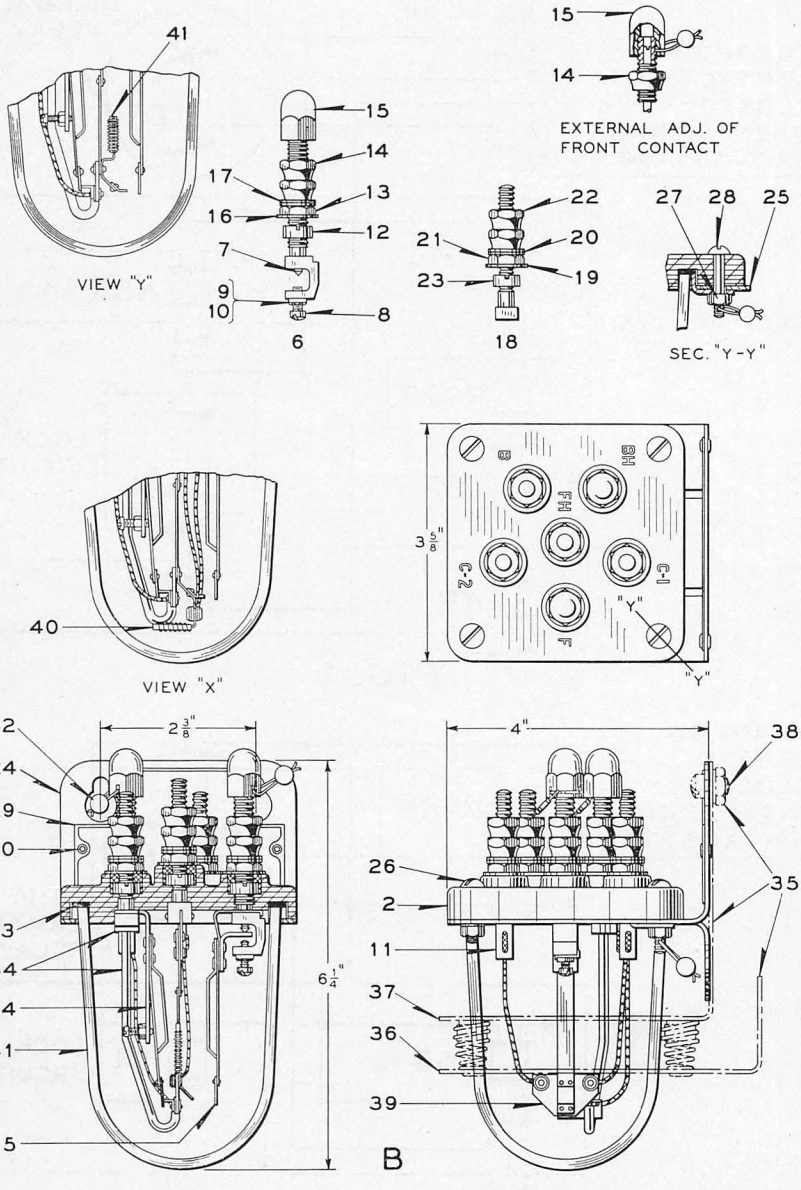
TER
B
TH-10
THERMAL
RELAY
C
ASR
TR
LOCK
CIRCUIT

FIG. 2



Style "TH-10" Thermal Relay

Style "TH-10" Thermal Relay

If operating voltage other than those listed is required, the order should specify the operating voltage if A.C. or number and type of battery cells if D.C. The relay will be shipped adjusted for any specified "Total" operating time within the range shown below for respective assemblies.

If Shock Absorber Ref. 35 is desired, orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "TH-10" Thermal Relay Complete, Dwg. B-12662-4

Piece	Ref.	Volts	Ohms Res.	Time Ranges Obtainable with Front Contact Adjustment		Thermal Contact Assembly Ref.
				*Front Contact Time	**Total Operating Time	
183881	**B**	10	10	10″ - 18″	45″ - 70″	39
183882	**Ba**	10	10	10″ - 18″	60″ - 90″	39
183883	**Bb**	10	10	10″ - 18″	80″ - 110″	39
183884	**Bc**	10	10	15″ - 27″	70″ - 100″	39a
183885	**Bd**	10	10	25″ - 35″	110″ - 135″	39b
215673	**Be**	10	10	35″ - 55″	140″ - 185″	40 (Per View "Y")
187707	**Bf**	10	10	60″ - 80″	180″ - 220″	41 (Per View "X")
183967	**Bg**	12	15	10″ - 18″	45″ - 70″	39c
183968	**Bh**	12	15	10″ - 18″	60″ - 90″	39c
183969	**Bj**	12	15	10″ - 18″	80″ - 110″	39c
183970	**Bk**	12	15	15″ - 27″	70″ - 100″	39d
183971	**Bm**	12	15	25″ - 35″	110″ - 135″	39e
234471	**Bn**	12	15	35″ - 55″	140″ - 185″	40a (Per View "Y")
192705	**Bp**	12	15	60″ - 80″	180″ - 220″	41a (Per View "X")

*"Front Contact time" is the time from the instant energy is applied to the heater coil until front contact closes.

**"Total Operating time" or "complete Operating Cycle" is the time from the instant energy is applied to the heater coil until the back contact recloses. This occurs after the action of the thermal element closes the front contact and some relay, thus picked up, opens the heater coil circuit and permits the thermal element to cool and reclose the back contact.

Style "TH-10" Thermal Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
194923	**2**	**Top Plate**	9968–1113
183519	**4**	**Back Contact Complete**	8385–2359
183541	**5**	**Front Contact Complete**	8385–2360
	6	**Adjusting Terminal Post, Complete** with Sealing Nut, Adjusting Screw, Nuts and Washers (Inc. 1-6a, 1-7, 1-8, 1-12, 1-13, 2-14, 1-15, 1-16 and 2-17)	12451–
183493	**6a**	**Adjusting Terminal Post Only** for Ref. 6	8094–2316
183637	**7**	**Adjusting Screw Only** for Ref. 6	8098–1102
	8	**Machine Screw** No. 6-40x½" Fil. Hd. Br. with Nut Ref. 9 and Nut Lock Ref. 10	12471–
30456	**9**	**Hex. Nut** for Ref. 8	8109–212
134516	**10**	**Nut Lock** for Ref. 8	8486–368
194196	**11**	**Terminal Connector** (Without Flexible Connector)	8244–112
183599	**12**	**Nut** for Ref. 6	8109–383
183600	**13**	**Hex. Nut** for Ref. 6	8109–38
183601	**14**	**Hex. Nut** for Ref. 6	8109–470
183638	**15**	**Sealing Nut** for Ref. 6	8109–471
183598	**16**	**Washer** for Ref. 6	7828–368
183633	**17**	**Washer** for Ref. 6	7828–376
	18	**Terminal Post, Complete** with Nuts and Washers (Inc. 1-18a, 1-19, 2-20, 1-21, 2-22 and 1-23)	12451–
115706	**18a**	**Terminal Post Only,** for Ref. 18	8094–1192
69705	**19**	**Washer Only,** for Ref. 18	7828–287
29102	**20**	**Washer Only,** for Ref. 18	7828–139
29103	**21**	**Hex. Nut Only,** for Ref. 18	8109–194
29101	**22**	**Hex. Nut Only,** for Ref. 18	8109–193

Style "TH-10" Thermal Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
72948	**23**	**Nut Only,** for Ref. 18	8109–383
183602	**24**	**Bracket**	10914–549
183603	**25**	**Clip**	11893–687
	26	**Machine Screw,** No. 10-30x7/8" Rd. Hd. Br. (N.P.) with No. 10 S. Lock Washer and Hex. Nut Ref. 27.	12471–
26942	**27**	**Hex. Nut** for Refs. 26 and 28	8109–184
	28	**Machine Screw** with hole for sealing and Hex. Nut Ref. 27	12471–
160470	**28a**	**Machine Screw Only** for Ref. 28	8098–919
183639	**29**	**Name Plate**	8225–448
143761	**30**	**Eyelet** for Ref. 29	12579–2
183469	**31**	**Cover Glass**	8163–214
152702	**32**	**Seal** with 2" of Seal Wire	8988–33
183635	**33**	**Gasket** for Ref. 31	8078–1499
	34	**Shipping Lock and Terminal Post, Complete With** Sealing Nut, Nuts and Washers (Inc. 1-34a, 1-15, 1-12, 1-16, 1-13, 2-17 and 2-14)	12451–
194857	**34a**	**Shipping Lock and Terminal Post Only**	8094–2348
218135	**35**	**Shock Absorber Complete,** with Bracket, Screws and Nuts (Inc. 1-36, 1-37 and 2-38)	12404–41
218125	**36**	**Shock Absorber Mounting Bracket with Springs**	12404–40
218124	**37**	**Bracket** for Shock Absorber	10914–1133
	38	**Screw** Ref. 38a with Nut Ref. 21 and 1/4" S. Lock Washer	12471–
58519	**38a**	**Screw Only**	8098–477

Style "TH-10" Thermal Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Thermal Contact Assembly, Complete, Including Heating Coil, Terminal Post, Flexible Leads.

Piece	Ref.	Ohms Res.	For Use with Ref.	Drawing Reference
183580	**39**	10	B, Ba and Bb	9065–240
183879	**39a**	10	Bc	9065–240
183880	**39b**	10	Bd	9065–240
183964	**39c**	15	Bg, Bh and Bj	9065–240
183965	**39d**	15	Bk	9065–240
183966	**39e**	15	Bm	9065–240
233944	**40**	10	Be	9065–317
234469	**40a**	15	Bn	9065–317
192176	**41**	10	Bf	9065–254
192706	**41a**	15	Bp	9065–254

Plug-In Relays

GENERAL DESCRIPTION

Relays of the plug-in type as shown in the following catalog plates are provided (a) for ready replacement in case of trouble or for periodic testing, (b) for positive assurance when replacements are made that the circuits are exactly as they were before the relay was changed, and (c) for space economy in mounting.

The assurance of circuit integrity is accomplished by provision for permanently soldered connections to the mounting bases which are not disturbed in replacing relays, and indexing to prevent mounting the wrong type of relay on a mounting base.

Various features of the plug-in line of relays aiding in accomplishing these results are described in the following paragraphs.

PLUG-IN OPERATION

Independent mounting bases containing spring-socket receptacles are permanently fastened to vertical supporting racks. Provision is made for soldering circuit connections to the receptacle terminals at the rear of each mounting base.

Plug connectors projecting from the rear of the relay base engage corresponding receptacles in the mounting base with high junction pressure to insure low contact resistance in the plug-in assembly.

The projecting plug connectors are of heavy material and are shielded from mechanical damage during relay handling by the surrounding wall of insulating material extending beyond their tips.

The coil circuit is likewise completed by plug connectors which extend forward from the mounting base to engage spring receptacles in the relay base, and at the same time function as visible guides for quick registration of the other plug connectors.

INDEXING

Indexing is provided on relays and bases so that relays of one type may not be inadvertantly plugged into the base for another type.

SIZE

The standard base size (vertical rack-space required) for the plug-in relays is 3¼″ wide and 7⅞″ high. In this space a neutral relay of 8F-8B dependent contacts, or a polar relay with 8N-8R contacts is mounted. This is about one-third the space required for an 8-point DN-11 relay.

TESTING

A simple and convenient means is provided, on relays with neutral armatures, for opening the coil circuit for testing without unsoldering any connection.

RELAY WINDINGS

The single coil used on plug-in relays is thoroughly impregnated. In place of the usual wire leads they have ribbon connectors fastened by screws to inserts moulded in the head of the coil.

MAGNETIC CIRCUIT

Magnetic circuits are constructed of non-aging material. The magnetic air-gap is not disturbed for relay coil replacement or contact spring replacement or adjustment.

CONTACTS

Contact fingers and springs consist of simple, straight, independent members. The heavy contact fingers extend through the relay base to serve as plug connectors registering with the receptacles in the mounting bases as previously described.

The heel contacts are actuated by operating arms of moulded insulation pivoted to the armature. Contact pressures are provided which are higher on both front and back contacts than on other standard relays. Contact surfaces have sufficient wiping action to be self-cleaning.

Standard low-voltage neutral contacts consist of silver to silver impregnated carbon front and silver to silver back contacts. Standard low-voltage polar contacts consist of silver to silver impregnated carbon on both normal and reverse contacts. All have standard 0.050″ opening and conform to A.A.R. requirements. High-voltage front and back contacts consisting of silver impregnated carbon to silver impregnated carbon are available.

COVER

A one-piece cover of transparent moulded glass fits over the relay and is sealed to its base by pressure against a gasket, providing a tight, dust-proof, moisture-protected assembly.

INDICATOR

An armature-position indicator is provided which consists of a member extending forward from the armature. This indicator drops into view or rises into concealment behind the relay nameplate as the relay is operated. A neutral armature in deenergized position displays red, and a polar armature in normal position shows green.

HANDLE

A sturdy handle at the front of the relay serves also as a means for applying a cover seal, and as a retainer for a dirt-protected label for circuit identification.

RELAY LOCK

The relay is held in place on the mounting base by a spring plunger lock which falls positively into place after the relay has fully engaged all its plug connectors. This lock is disengaged by a test and lock lever when removing the relay from its base.

TEST AND LOCK LEVER

The test and lock lever is furnished for releasing the relay lock and for operating the test contact. One is shipped with each relay order, and for large orders one for each hundred relays ordered.

OTHER FEATURES

Relay pulls out or plugs in horizontally.

Relay locks securely in plug-in position.

Each contact member and coil lead has an individual plug connector.

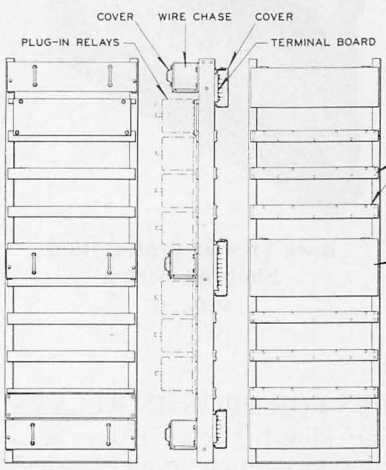
All parts insulated to withstand 3000-volt ground test.

Plug connections protected from dust, moisture and mechanical damage.

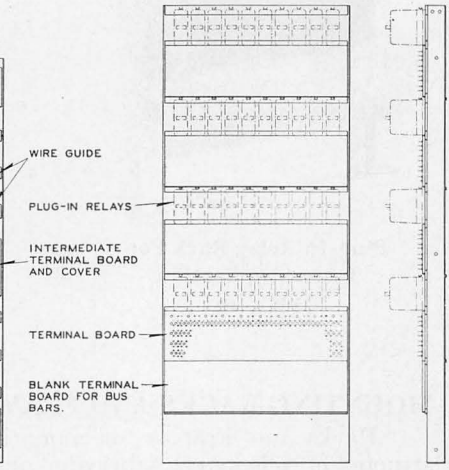
Name Plates differ in color for various style relays to aid in distinguishing them readily, e.g. black for neutral and red for polar relays.

RELAY COMBINATIONS

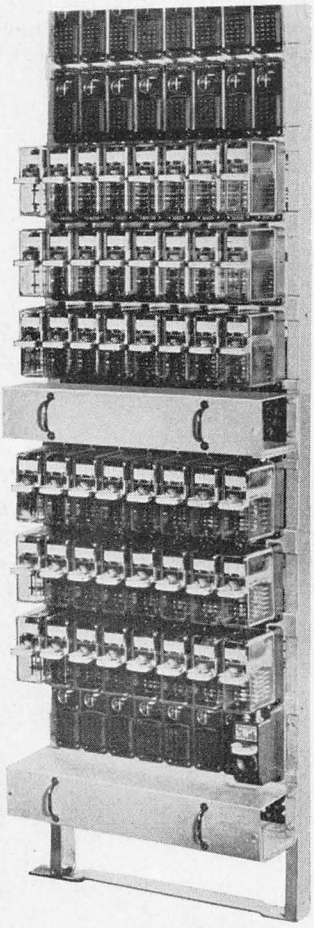
Special combinations of the "PP-51" polar and the "PN-50" neutral relays are available to accomplish checking of polar armature response as in the "DP-17" relay and the retained-neutral armature feature as in the "DP-20" relay. These are known as the "PP51-1" and the "PP51-2" relay combinations and are shown on Plate E-5345.



Terminal Board Connections On Back FIG. 1

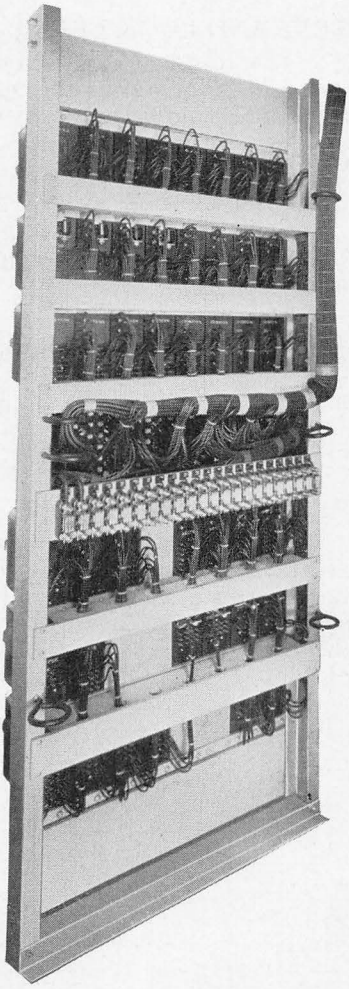


Terminal Board Connections On Front FIG. 1a



Plug-In Relay Rack For Tower Application

FIG. 1b



Back View af Typical Rack Showing Wiring

FIG. 1c

MOUNTING RACKS AND FRAMES FOR PLUG-IN RELAYS

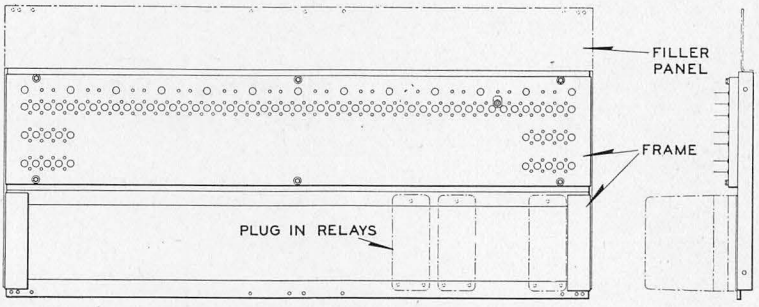
Racks and Frames for mounting Plug-In Relay Bases, constructed of rolled steel, fabricated and welded as a unit, and finished to conform with surroundings, have been designed to meet various tower and relay case requirements. These are complete with the necessary terminal boards and wire chases for outgoing wires and when desired can be furnished with the relay bases wired to the associated terminal boards.

Figs. 1 and 1a show diagrams of racks and names for some of the detail parts. If any repair parts are desired for a rack, orders should give the name of desired part and the installation at which the rack is used.

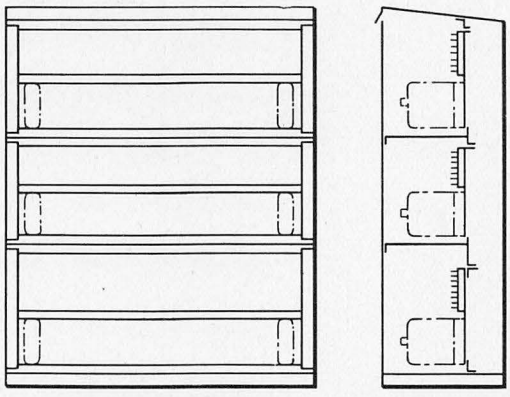
Figs. 1b and 1c show front and rear views of typical racks. Orders for relay racks for towers or relay houses should be accompanied by information as to floor space, ceiling height, wire chase requirements, relay and terminal board capacity.

Fig. 2 shows a typical frame with terminal board for use in existing standard shelf-type sheet steel instrument cases. The frame is interchangeable with existing backboards. For new installations shelves are omitted. Frames may be furnished for other designs of case upon receipt of detail ordering information.

Fig. 2a shows frame mounted in Instrument Case.



Frame with Filler Panel to Fit Shelf Type Instrument Cases
FIG. 2



Frame Mounted in Instrument Case
FIG. 2a

Style "PP51-1" and Style "PP51-2" Relay Combinations

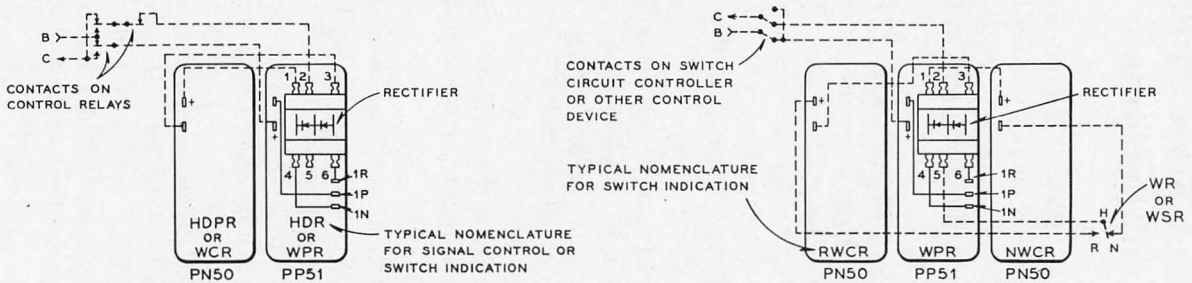
Special combinations of the "PN-50" neutral relay and the "PP-51" polar relay including a small plug-in rectifier are available to accomplish checking of polar armature response as in the "DP-17" relay and the retained-neutral armature feature as in the "DP-20" relay.

Combinations known as the "PP51-1" and "PP51-2" relay combinations are available. The relay assemblies are standard except for a slight difference in adjustment of the "PP-51" relay. The mounting base for the "PP-51" relay includes a plug-in receptacle for the rectifier (See Ref. 3, Plate E-5387). The rectifier is used in such a way that all predictable types of failures of the relays and rectifiers are checked.

A typical circuit for the "PP51-1" combination is shown in Fig. A. A "PP-51" relay and a single "PN-50" relay provide 8F-8B neutral and 7N-7R polar contacts for use in external circuits. The "PN-50" relay will not pick up until the "PP-51" relay agrees in position with the polarity of the circuit. When the circuit is pole changed quickly as by relay contacts, the "PN-50" relay does not drop out unless there should be a failure of the "PP-51" relay to reverse.

A typical circuit for the "PP51-2" combination is shown in Fig. B. A "PP-51" relay and two "PN-50" relays are used. This combination is used principally for switch indication. The normal or reverse repeater (NWCR or RWCR) cannot pick up unless the position of the "PP-51" relay armature agrees with the polarity of the circuit. A check on the position of the WR relay is also incorporated in the circuit. Contact capacity of the combination is 8N-8R independent and completely checked contacts (by means of the front contacts of the "PN-50" relays, NWCR and RWCR respectively). There are also 7N-7R dependent polar contacts available on the "PP-51" relay. These contacts are not checked but are usable for some types of circuits.

SOLID LINES INDICATE FACTORY WIRING ON RELAY MOUNTING BASE



TYPICAL CIRCUIT DIAGRAM OF PP51-1 RELAY COMBINATION

A

TYPICAL CIRCUIT DIAGRAM OF PP51-2 RELAY COMBINATION

B

(VIEWS LOOKING AT BACK OF RELAY MOUNTING BASES)

Styles "PP51-1" and "PP51-2" Relay Combinations

Styles "PP51-1" and "PP51-2" Relay Combinations

Used for Switch Indication, Retained Neutral Polarized Signal Controls, Etc.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "PP51-1" Relay Combination. Used for Switch Indication, Retained Neutral Polarized Signal Control, Etc.

Ref.	Operating Voltage	"PN-50" Relay				"PP-51" Relay				Rectifier Ref. Plate E-5387
		Piece	Res.	Contacts	Mounting Base Ref. Plate E-5364	Piece	Res.	*Contacts	Mounting Base Ref. Plate E-5387	
A	12	229735	400	8F–8B	2	228424	100	8N–8R	3	15
Aa	12	229734	400	4F–4B	+ 2b	228424	100	8N–8R	3	15

Style "PP51-2" Relay Combination. Used for Switch Indication

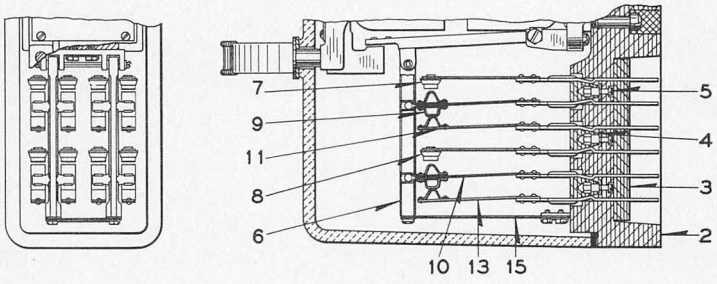
Ref.	Operating Voltage	"PN-50" Relay				"PP-51" Relay				Rectifier Ref. Plate E-5387
		Piece	Res.	Contacts	Mounting Base Ref. Plate E-5364	Piece	Res.	*Contacts	Mounting Base Ref. Plate E-5387	
B	12	229735	400	8F–8B	2	228424	100	8N–8R	3	15

* 1N-1R used in control circuit, 7N-7R available for use in other circuits.

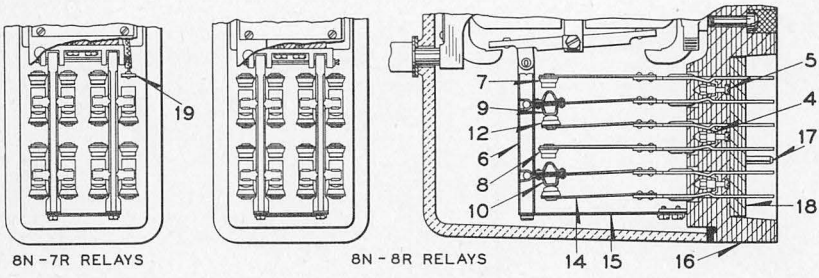
\+ 4-Point Base, 8-Point Base can be used.

PLATE E-5350

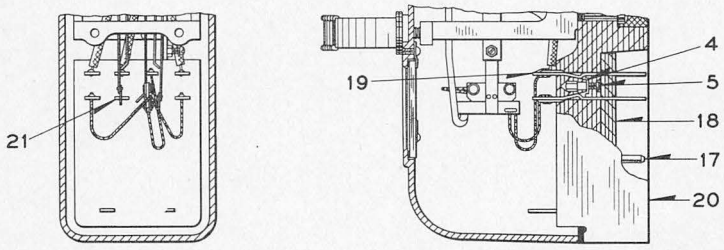
FOR DETAILS NOT SHOWN ON THIS PLATE, REFER TO PLATE SHOWING LATER DESIGN OF RELAY WITH "MOLDED IN" CONTACT FINGERS



CONTACT SPRINGS (WEDGE TYPE SUPPORT) FOR PN-50 RELAYS



CONTACT SPRINGS (WEDGE TYPE SUPPORT) FOR PP-51 RELAYS



CONTACT SPRINGS (WEDGE TYPE SUPPORT) FOR PT-52 RELAYS

STYLES PN-50, PP-51 AND PT-52 RELAYS WITH INDIVIDUALLY MOUNTED CONTACT FINGERS

2-18-42

STYLES "PN-50", "PP-51" AND "PT-52" RELAYS WITH INDIVIDUALLY MOUNTED CONTACT FINGERS

DETAIL PARTS

For details not shown on this Plate, refer to Plate showing later design of Relay with *Molded In* contacts.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

PIECE	REF.	DESCRIPTION	DWG. REF.
102122	2	Relay Base	C-16649-1
102136	3	Clamping Plate	8750-2821
102237	4	Clamping Block (Wedge)	8750-2819
	5	Machine Screw, No. 4-48x3/8" Fil. Hd. S. (Tin Pl.)	
102236	6	Operating Arm	8750-2870
102199	7	Front Or Reverse Contact Complete. Used in Spaces, 1, 2, 3 or 4 (Sil. Imp. Carbon Tip)	8385-2570
102200	8	Front Or Reverse Contact Complete. Used in Spaces, 5, 6, 7 or 8 (Sil. Imp. Carbon Tip)	8385-2570
102206	9	Heel Contact Complete (Silver Front and Back Tips)	8385-2574
102207	10	Heel Contact Complete (Silver Front and Back Tips)	8385-2574
102216	11	Back Contact Complete (Silver Tip)	8385-2576
104623	12	Normal Or Back Contact Complete. Used in Spaces 1, 2, 3 or 4 (Sil. Imp. Carbon Tip)	8385-2595
102217	13	Back Contact Complete (Silver Tip)	8385-2576
104624	14	Normal Or Back Contact Complete. Used in Spaces 5, 6, 7 or 8 (Sil. Imp. Carbon Tip)	8385-2595
102194	15	Guide Spring	8735-884
104651	16	Relay Base	C-16649-1
	17	Guide Pin With Nut and Lock Washer Inc. 1-17a, 1-17b and 1-17c	12471
104617	17a	Guide Pin Only	8097-767
104618	17b	Nut	8109-497
	17c	Lock Washer No.6 Steel Tin Pl.	
102229	18	Clamping Plate	8750-2821
104610	19	Contact Finger without Spring or Tip Used on 8N-7R PP-51 Relays and PT-52 Relays	8385-2594
104650	20	Relay Base	C-16649-1
104611	21	Plug	8385-2594

"PN-50" Plug-In Neutral D. C. Relay

(Refer also to "General Description" of Plug-In Relays Plate E-5340).

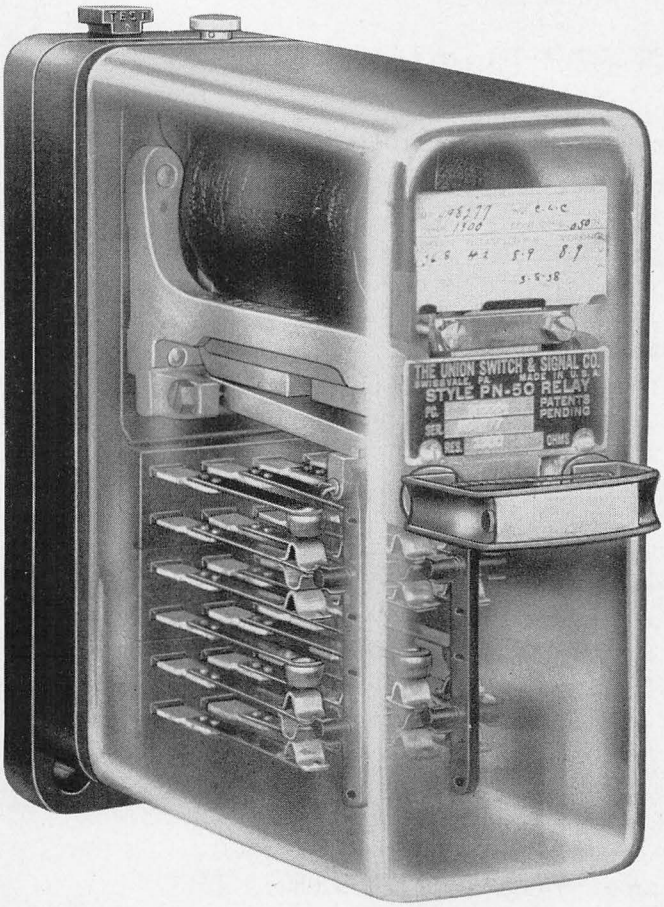
This relay conforms to the same high standards as other "Union" relays of the safety type, and meets A.A.R. requirements for 3000-volt ground test, minimum armature air-gap, and electrical and mechanical clearances.

A feature of the "PN-50" plug-in relay is the use of a permanent magnet to exert an additional downward pull on the armature when in the released position. This aids the gravity torque in achieving a back contact pressure higher than previously used on d-c. relays. It also removes any need for hold-down spring or shock absorbers, and makes the relay normally responsive to only one polarity of energizing current.

The permanent magnet is given special magnetizing treatment which assures unchanging characteristics.

Where slow release of the "PN-50" relays is required for special circuit applications, rectifier or resistor snubs are provided. It has been found that the time values involved in the operation of plug-in relays permit using these snubs in place of special coils and thus permit standardization of relays.

Combinations of "PN-50" neutral relays and "PP-51" polar relays are shown and described in Plate E-5345.



Style "PN-50" D. C. Neutral Relays

Style "PN-50" D. C. Neutral Relays

Unless otherwise specified Relays will be furnished with Silver to Silver Imp. Carbon Front and Silver to Silver Back Contacts.

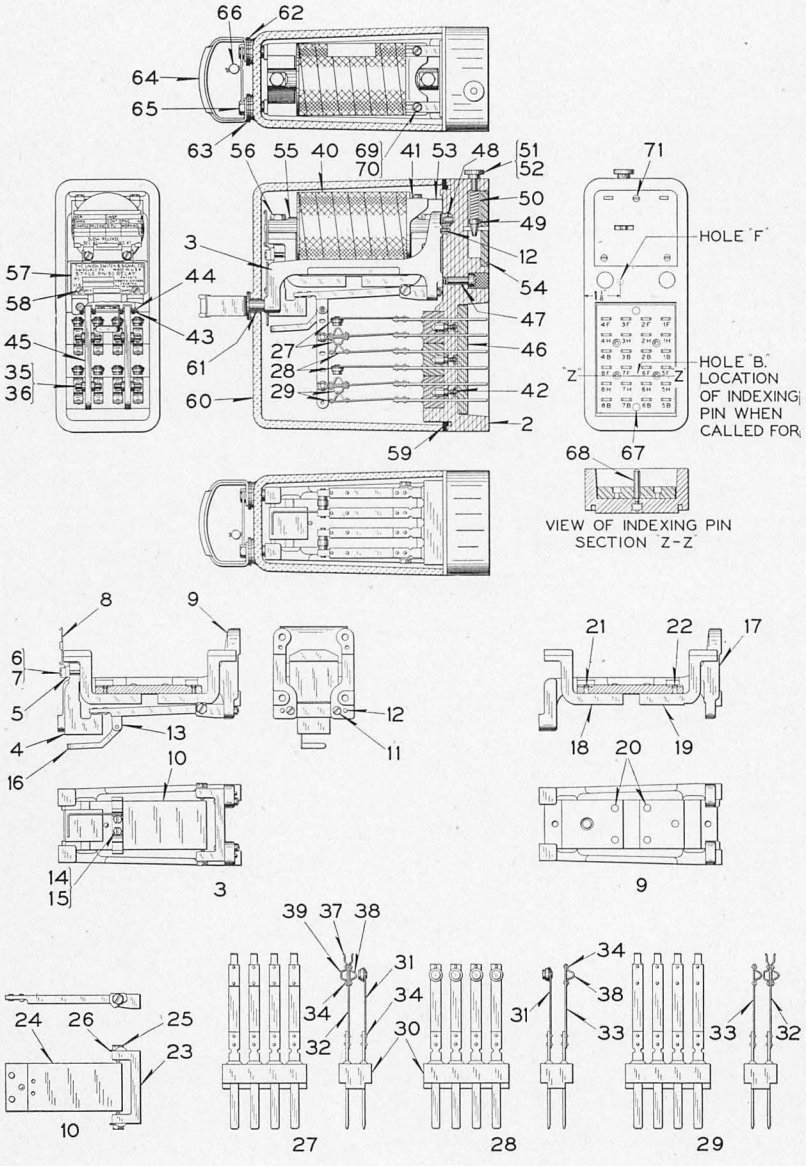
Orders should specify resistance of Coils or voltage across Relay winding. If a snub for slow release is desired, this is applied to the relay mounting base and the proper rectifier or resistance for particular circuit conditions can be obtained by consulting our district office.

For details see the following Plates: 8F-8B Relay Plate E-5361; 4F-4B Relay Plate E-5362; 10F-2B Relay Plate E-5363.

Relays do not include Mounting Bases, assemblies and details of which are shown on Plate E-5364.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "PN-50" D.C. Neutral Relay** (no indexing) with 8F-8B Dependent L.V. Contacts and..... -Ohms coil.....	C–16648–3
	Aa	**Style "PN-50" D.C. Neutral Relay** (indexed for track use) with 8F-8B Dependent L.V. Contacts and .....-Ohms coil.....	C–16648–3
	B	**Style "PN-50" D.C. Neutral Relay** (no indexing) with 4F-4B Dependent L.V. Contacts and..... -Ohms coil.....	C–16648–3
	Ba	**Style "PN-50" D.C. Neutral Relay** (indexed for track use) with 4F-4B Dependent L.V. Contacts and .....-Ohms coil.....	C–16648–3
	C	**Style "PN-50" D.C. Neutral Relay** (indexed to fit 10 point mounting base only) with 10F-2B Ind. L.V. Contacts and .....-Ohms coil.....	C–16648–3



Details of Style "PN-50" D. C. Neutral Relay

(8F-8B Contacts)

Details of Style "PN-50" D. C. Neutral Relay
(8F-8B Contacts)

For Relays complete refer to Plate E-5360.
Details of individually mounted contact fingers will be found on Plate E-5350, which has been supplied to the railroads using that type of relay.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
108940	**2**	**Relay Base** (Without Holes "B" or "F") (For Line use)	C–16649–10
220500	**2a**	**Relay Base** (With Holes "B" and "F") (For Track use)	C–16649–13
102163	**3**	**Armature and Magnet Assembly Complete** (Inc. 1-3a, 1-4, 1-5, 2-6, 1-7 and 1-8)	C–16649–5
104247	**3a**	**Armature and Pole Piece Assembly Complete** (Inc. 1-9, 1-10, 2-11, 2-12, 1-13, 2-14, 1-15 and 1-16)	C–16649–5
221236	**4**	**Permanent Magnet** (8 Point Line or Track Relay)	12586–21
102159	**5**	**Strap**	12538–184
208668	**6**	**Screw**	8098–701
208706	**7**	**Bolt Lock**	8486–399
102187	**8**	**Calibration Tag Clip**	11893–843
102170	**9**	**Pole Piece Assembly Complete** for Ref. 3a (Inc. 1-17, 1-18, 1-19, 4-20, 1-21 and 1-22)	C–16649–6
102171	**10**	**Armature Assembly** for Ref. 3a (Inc. 1-23, 1-24, 2-25 and 2-26)	C–16649–6
	11	**Machine Screw,** No. 8-36x5/8" Fil. Hd. Br.	
57497	**12**	**Dowel Pin**	8097–872
102192	**13**	**Operating Arm Bracket**	12748–7
225022	**14**	**Screw**	8098–1300
225023	**15**	**Bolt Lock**	8486–432
225025	**16**	**Armature Position Indicator**	12748–29
101174	**17**	**Mounting Bracket**	C–16649–4
102156	**18**	**Pole Piece** (Front)	8250–111
102157	**19**	**Pole Piece** (Rear)	8250–111

Details of Style "PN-50" D. C. Neutral Relay
(8F-8B Contacts)

(**Continued**)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
105417	**20**	**Pin**	8097–567
102147	**21**	**Stop Pin**	8097–567
223495	**22**	**Pin**	8097–567
101706	**23**	**Armature Bracket**	8303–130
102161	**24**	**Armature Complete** for Ref. 10	8157–441
102162	**25**	**Pivot Screw**	8378–376
159815	**26**	**Bolt Lock**	8486–395
108933	**27**	**Contact Block Complete,** 4F Contacts (Silver Imp. Carbon) and 4H Contacts (Silver; for F and B) (Inc. 1-30, 4-31, 4-32 and 16-34)	C–16649–9
108934	**28**	**Contact Block Complete,** 4B Contacts (Silver) and 4F Contacts (Silver Imp. Carbon) (Inc. 1-30, 4-31, 4-33 and 16-34)	C–16649–9
108935	**29**	**Contact Block Complete,** 4H Contacts (Silver, for F and B) and 4B Contacts (Silver) (Inc. 1-30, 4-32, 4-33 and 16-34)	C–16649–9
108932	**30**	**Contact Block** with molded-in fingers but no contact springs	C–16649–11
102197	**31**	**Front Contact Spring** with Silver Imp. Carbon Tip	8385–2569
102205	**32**	**Heel Contact Spring** with Silver Tips (Inc. 1-32a, 2-37, 1-38, 1-39 and 2-34)	8385–2573
102203	**32a**	**Contact Spring Only**	8385–2572
102215	**33**	**Back Contact Spring** with Silver Tip (Inc. 1-33a, 1-38 and 2-34)	8385–2575
102204	**33a**	**Contact Spring Only**	8385–2572
37417	**34**	**Rivet**	10301–21
232030	**35**	**Bushing**	12770–42
232031	**36**	**Pin**	8097–973

Details of Style "PN-50" D. C. Neutral Relay
(8F-8B Contacts)

(**Continued**)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

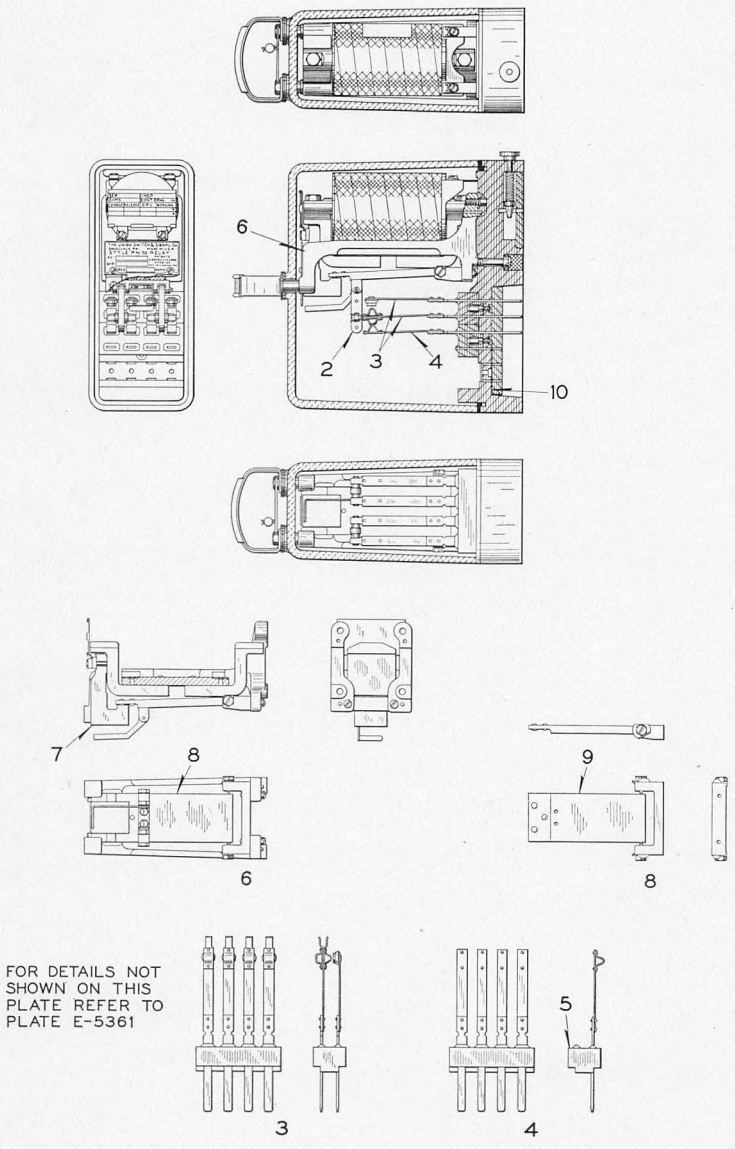
Piece	Ref.	Description	Drawing Reference
102193	**37**	**Contact Operating Clip**	8735–883
102143	**38**	**Contact Tip** (Silver)	8341–245
102144	**39**	**Contact Tip** (Silver)	8341–245
102211	**40**	**Coil,** 2-Ohms	8133–501
102208	**40a**	**Coil,** 4-Ohms	8133–501
219876	**40b**	**Coil,** 240-Ohms	8133–501
102210	**40c**	**Coil,** 400-Ohms	8133–501
102214	**40d**	**Coil,** 550-Ohms	8133–501
102213	**40e**	**Coil,** 800-Ohms	8133–501
102209	**40f**	**Coil,** 1300-Ohms	8133–501
102212	**40g**	**Coil,** 2000-Ohms	8133–501
28576	**41**	**Bolt Lock**	8486–101
	42	**Machine Screw,** No. 6-40x$\frac{7}{16}$" Fil. Hd. S.	
102181	**43**	**Washer**	7828–401
210445	**44**	**Pivot Pin**	8097–852
232027	**45**	**Operating Arm**	12770–40
	45a	**Operating Arm** with Pins and Bushings (not assembled) for replacement of old single piece operating arm (Inc. 1-45, 4-35 and 2-36)	12770–
102136	**46**	**Clamping Plate**	8750–2821
	47	**Machine Screw,** No. 14-24x1$\frac{3}{8}$" Fil. Hd. S.	
	48	**Machine Screw,** No. 14-24x1$\frac{1}{4}$" Fil. Hd. S.	
102135	**49**	**Latch Pin**	8097–760
102152	**50**	**Coil Spring**	8124–263

Details of Style "PN-50" D. C. Neutral Relay
(8F-8B Contacts)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Refrence
102148	**51**	**Collar**	8350–901
54928	**52**	**Rivet**	10301–21
102176	**53**	**Receptacle Spring for Coil Connection**	8385–2552
102126	**54**	**Cover Plate**	8750–2820
102164	**55**	**Core**	8101–392
	56	**Cap Screw,** $\frac{1}{4}$"-20x$\frac{11}{16}$" Hex. Hd. S.	
102186	**57**	**Name Plate**	8225–516
	58	**Screw,** No. 4x$\frac{1}{4}$" Rd. Hd. Hardened	
102127	**59**	**Gasket**	8078–1652
102139	**60**	**Cover Glass**	C–16649–3
211511	**61**	**Spacer**	8350–856
108725	**62**	**Gasket,** $\frac{1}{32}$" thick	8078–1691
108726	**62a**	**Gasket,** $\frac{1}{16}$" thick	8078–1691
114106	**63**	**Washer**	7828–339
104612	**64**	**Handle Complete**	8311–112
102179	**65**	**Screw**	8190–405
152702	**66**	**Seal** with 6" of seal wire	8988–33
	67	**Machine Screw,** No. 4-48x$\frac{1}{4}$" Fil. Hd. S.	
	68	**Index Pin** Ref. 68a with Nut Ref. 68b and No. 6 Steel Lock Washer	8097–767
108948	**68a**	**Index Pin Only**	8097–767
104618	**68b**	**Nut**	8109–497
208930	**69**	**Screw**	8098–1300
102169	**70**	**Washer**	7828–401
	71	**Machine Screw,** No. 4-48x$\frac{3}{8}$" Flat Hd. S.	



Details of Style "PN-50" D. C. Neutral Relay

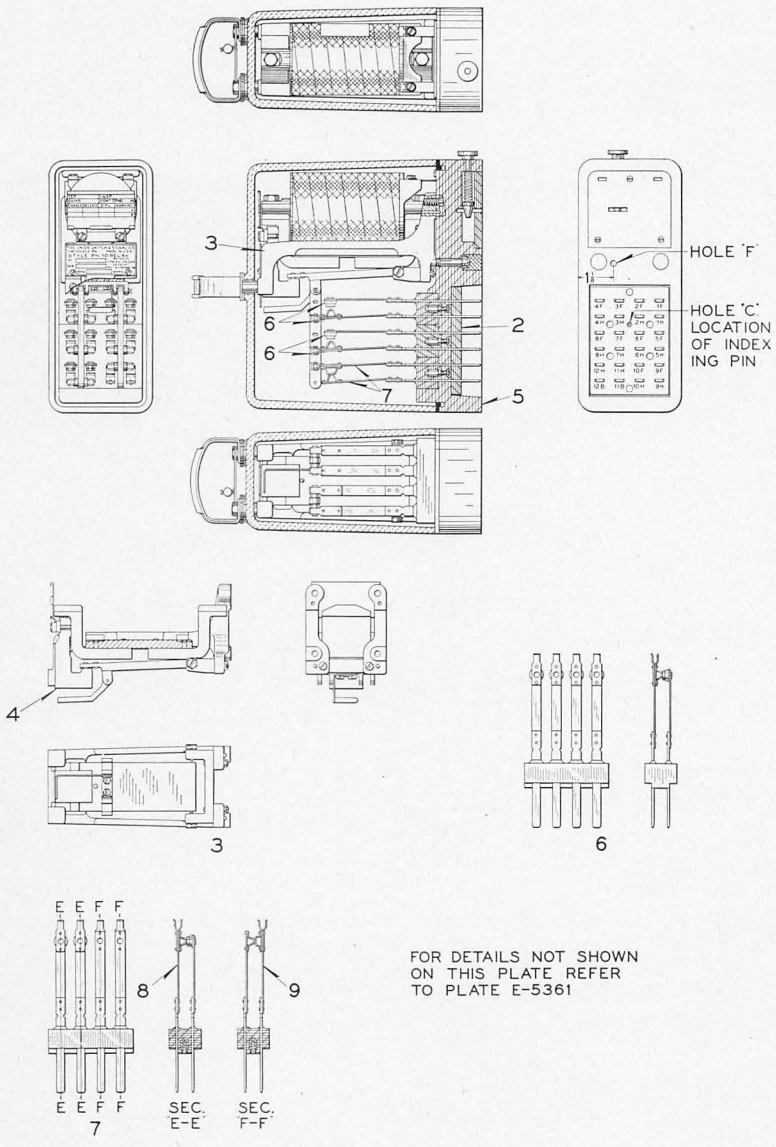
(4F-4B Contacts)

Details of Style "PN-50" D. C. Neutral Relay
(4F-4B Contacts)

For details not shown on this Plate refer to Plate E-5361.
For Relays complete refer to Plate E-5360.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
232029	**2**	**Operating Arm**	12770–41
	2a	**Operating Arm** with Pin and Bushings (not assembled) for replacement of old single piece operating arm (Inc. 1-2 of this Plate and 2-35 and 1-36 of Plate E-5361)	12770–
108933	**3**	**Contact Block Complete,** 4F Contacts (Silver Imp. Carbon) and 4H Contacts (Silver; for F and B) (Inc. 1-30, 4-31, 4-32 and 16-34 of Plate E-5361)	C–16649–9
218762	**4**	**Contact Block Complete,** 4B Contacts (Silver) (Inc. 1-5 of this Plate and 4-33 and 8-34 of Plate E-5361)	C–16649–9
108949	**5**	**Contact Block** with molded-in fingers but no Contact Springs	C–16649–11
218760	**6**	**Armature and Magnet Assembly Complete** (Inc. 1-6a and 1-7 of this Plate and 1-5, 2-6, 1-7 and 1-8 of Plate E-5361)	C–16649–5
218766	**6a**	**Armature and Pole Piece Assembly Complete** (Inc. 1-8 of this Plate and 1-9, 2-11, 2-12, 1-13, 2-14, 1-15 and 1-16 of Plate E-5361)	C–16649–5
221237	**7**	**Permanent Magnet**	12586–21
218765	**8**	**Armature Assembly** for Ref. 6a (Inc. 1-9 of this Plate and 1-23, 2-25 and 2-26 of Plate E-5361)	C–16649–6
218764	**9**	**Armature Complete**	8157–441
218767	**10**	**Insulation**	8750–2894



FOR DETAILS NOT SHOWN ON THIS PLATE REFER TO PLATE E-5361

Details of Style "PN-50" D. C. Neutral Relay

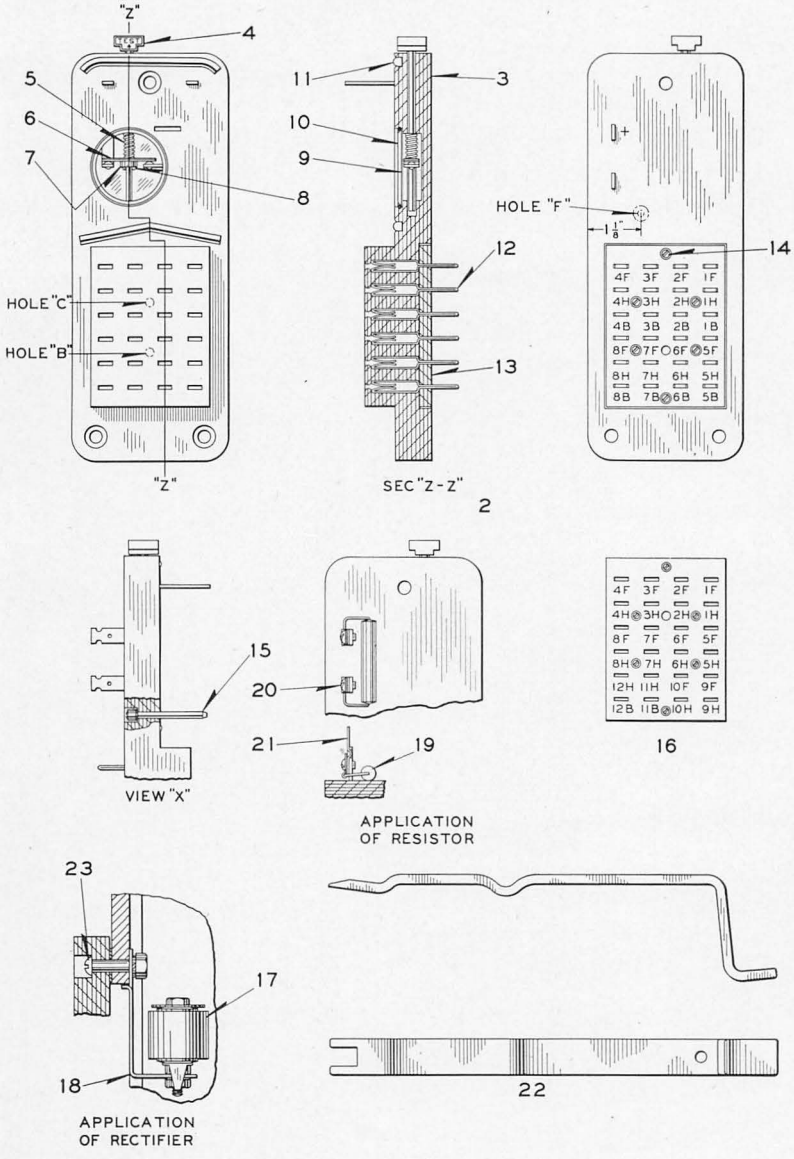
(10F-2B Contacts)

Details of Style "PN-50" D. C. Neutral Relay
(10F-2B Contacts)

For details not shown on this Plate refer to Plate E-5361.
For Relays complete refer to Plate E-5360.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
226556	2	**Clamping Plate**	8750–3021
226590	3	**Armature and Magnet Assembly Complete** (Inc. 1-4 of this Plate and 1-3a, 1-5, 2-6, 1-7 and 1-8 of Plate E-5361)	C–16649–5
221237	4	**Permanent Magnet**	12586–21
226587	5	**Relay Base** (With Holes "C" and "F")	C–16649–13
226583	6	**Contact Block Complete,** 4F Contacts (Silver Imp. Carbon) and 4H Contacts (Silver; for F only) (Inc. 4-8 of this Plate and 1-30, 4-31 and 16-34 of Plate E-5361)	C–16649–12
226584	7	**Contact Block Complete,** 2F Contacts (Silver Imp. Carbon), 2B Contacts (Silver) and 4H Contacts (Silver; for F or B) (Inc. 2-8 and 2-9 of this Plate and 1-30, 2-31, 2-33 and 16-34 of Plate E-5361)	C–16649–12
226557	8	**Heel Contact Spring** with Silver Tip (Inc. 1-32a, 2-34, 2-37 and 1-38 of Plate E-5361)	8385–2720
226582	9	**Heel Contact Spring** with Silver Tip (Inc. 1-32a, 2-34, 2-37 and 1-39 of Plate E-5361)	8385–2720



Mounting Bases for "PN-50" Relays

Style "PN-50" D. C. Neutral Relays

Detail Parts

Mounting Bases

See Plate E-5360 for complete Relays and Plates E-5361, E-5362 and E-5363 for relay details.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102167	**2**	**Mounting Base, Complete,** for use with "PN-50" Relay having 8F and 8B Contacts and no Indexing Pin (Without Holes "C", "B", "F", or Indexing Pin Ref. 15)	C–16655–1
220496	**2a**	**Mounting Base Complete,** for use with "PN-50" Relay having 8F and 8B Contacts and Indexing Pin (With Hole "B" and Indexing Pin Ref. 15 per View "X" located in hole "F")	C–16655–1
218761	**2b**	**Mounting Base Complete,** for use with "PN-50" Relay having 4F and 4B Contacts and no Indexing Pin (Without Holes "C", "B", "F", or Indexing Pin Ref. 15)	C–16655–1
220497	**2c**	**Mounting Base Complete,** for use with "PN-50" Relay having 4F and 4B Contacts and Indexing Pin (With Hole "B" and Indexing Pin Ref. 15 per View "X" located in hole "F")	C–16655–1
226554	**2d**	**Mounting Base Complete,** for use with "PN-50" Relay having 10F and 2B Contacts and Indexing Pin (With Hole "C", Indexing Pin Ref. 15 per View "X" located in hole "F" and Clamping Plate Ref. 16)	C–16655–1
102130	**3**	**Mounting Base Only** (Without Holes "C", "B" or "F") for Refs. 2 and 2b	C–16649–2
220502	**3a**	**Mounting Base Only,** with Holes "B" and "F" for Refs. 2a and 2c	C–16649–2
226551	**3b**	**Mounting Base Only,** with Holes "C" and "F" for Ref. 2d	C–16649–2
219795	**4**	**Contact Breaker Complete**	8750–2825
102154	**5**	**Coil Spring**	8124–263
102150	**6**	**Contacting Bar**	8341–246
208606	**7**	**Washer**	8112–66
	8	**Brass Cotter,** $\frac{1}{16}$"x$\frac{1}{4}$"	
102145	**9**	**Glass**	8163–316

Style "PN-50" D. C. Neutral Relays

Detail Parts

Mounting Bases

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102180	**10**	**Retaining Spring**	8124–262
102239	**11**	**Gasket**	8078–1654
102172	**12**	**Receptacle Spring**	8385–2550
102136	**13**	**Clamping Plate**	8750–2821
	14	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. with No. 4 Pl. S. Lock Washer (3/32"x1/32")	
	15	**Index Pin** Ref. 15a with Nut Ref. 15b and No. 6 Lock Washer	8097–767
104617	**15a**	**Index Pin Only**	8097–767
104618	**15b**	**Nut**	8109–497
226556	**16**	**Clamping Plate** for Ref. 2d	8750–3021
105315	**17**	**Rectifier** with Bracket Ref. 18, ¼"-20 Hex. Jam Nut and ¼" Pl. S. Lock Washer (3/32"x1/16")	12746–5
105296	**17a**	**Rectifier Only**	12746–5
105295	**18**	**Bracket**	10914–975
	19	**Resistor Complete** (Orders should specify resistance desired)	9065–309
	20	**Machine Screw,** No. 8-36x3/16" Rd. Hd. Br. with No. 8 Ph. Bz. Lock Washer	
230277	**21**	**Terminal Extension**	8244–174
102238	**22**	**Test and Lock Lever**	A–2586–25
	23	**Machine Screw,** ¼"-20x1⅛" Rd. Hd. S. with ¼" Pl. S. Lock Washer (3/32"x1/16") and ¼"-20 Hex. S. Nut. For attaching Relay Mounting Bases to Rack.	

"PP-51" Plug-In Polar D. C. Relay

(Refer to "General Description" of Plug-In Relays, Plate E-5340).

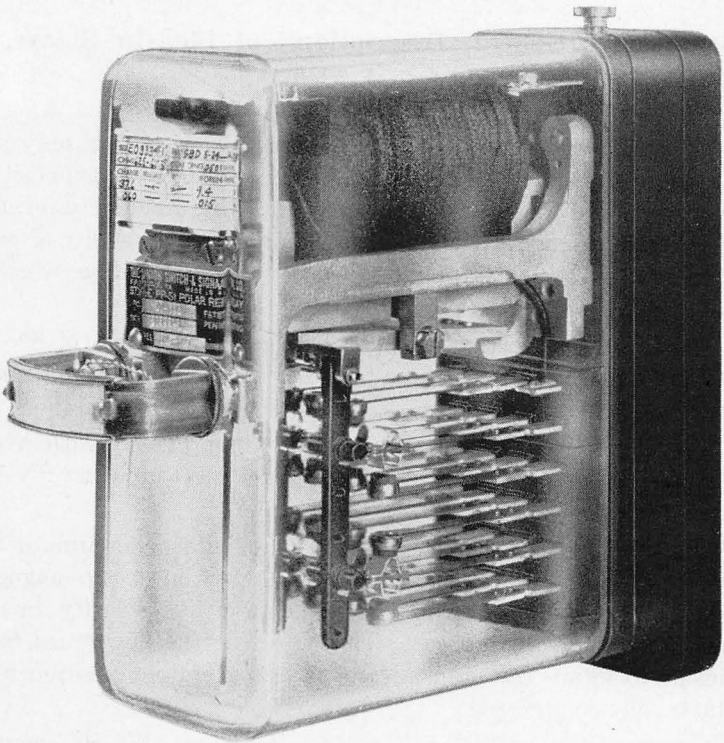
The "PP-51" polar plug-in relay has polar contacts only and its armature will remain against its stop in its last energized position when energy is disconnected from the relay. It responds to reversal of polarity of energy across its full winding, or to a transfer of positive energy from one-half to the other of a tapped winding, which is supplied when requested.

A relay with the two-terminal coil has a maximum of 8N-8R contacts and one with the three-terminal (tapped) coil has a maximum of 8N-7R contacts.

For easy identification these relays are provided with a red name plate, to distinguish them from the black plate used on "PN-50" relays.

The "PP-51" has no neutral armature. Its polar armature is centrally pivoted and is acted upon not only by the electro-magnetic circuit but also by two permanent magnets of like polarity, one at the front and one at the rear. These provide the downward force sufficient to retain the armature in its last energized position with contacts fully compressed.

Combinations of "PP-51" polar relays and "PN-50" neutral relays are shown and described in Plate E-5345.



Style "PP-51" D. C. Polar Relays

Style "PP-51" D. C. Polar Relays

Unless otherwise specified Relays will be furnished with Silver to Silver Imp. Carbon Normal and Reverse Contacts.

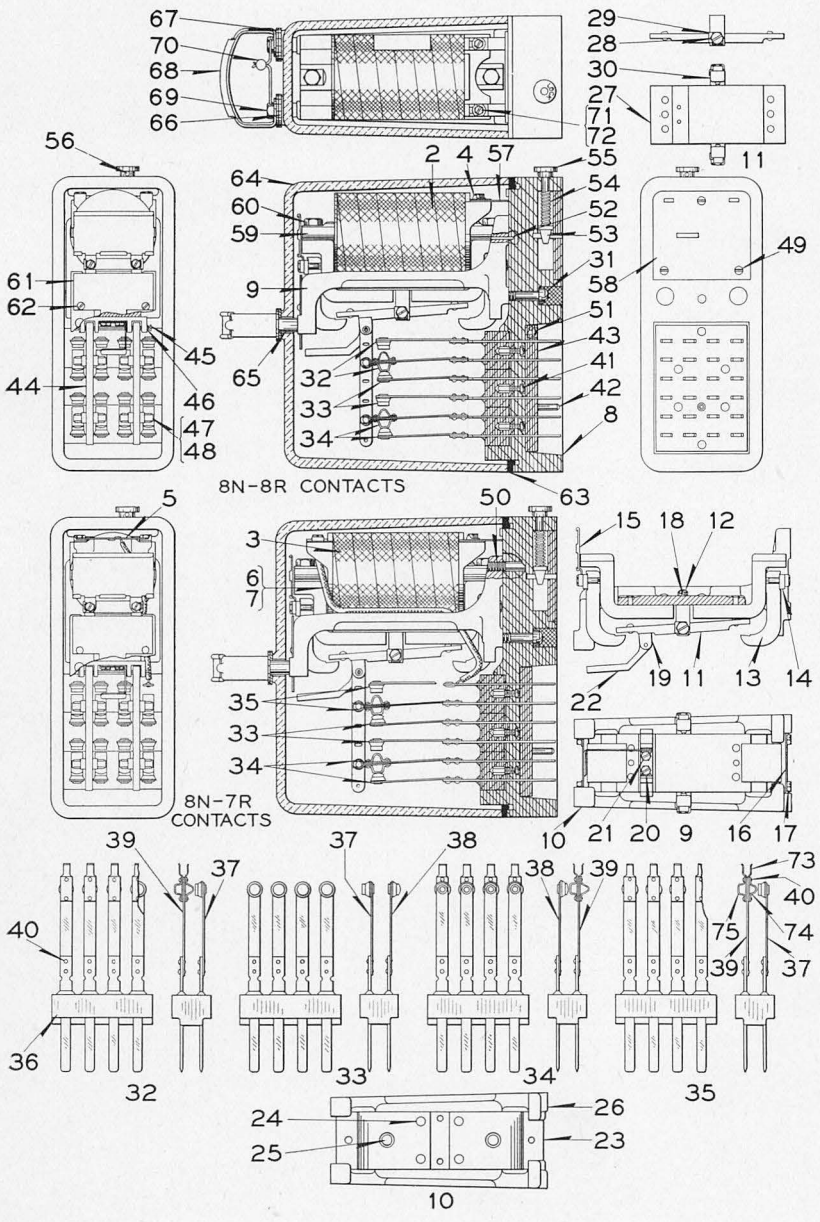
Orders should specify resistance of Coils or voltage across Relay winding.

For details see Plate E-5386.

Relays do not include Mounting Bases, assemblies and details of which are shown on Plate E-5387.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "PP-51" D.C. Polar Relay** with 8N-8R Contacts and .....-Ohms Single Wound Coil.....	C–16676–6
	B	**Style "PP-51" D.C. Polar Relay** with 8N-7R Contacts (as shown) and .....-Ohms Double Wound Coil.....	C–16676–3
	C	**Style "PP-51" D.C. Polar Relay** with 8N-8R Contacts and Single Wound Coil for use in "PP51-1" or "PP51-2" combination. See tabulation on Plate E-5345.....	C–16676–6



Details of Style "PP-51" D. C. Polar Relays

Details of Style "PP-51" D. C. Polar Relays

For Relays complete refer to Plate E-5385.
Details of individually mounted contact fingers will be found on Plate E-5350, which has been supplied to the railroads using that type of relay.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102213	**2**	**Coil** (Single Wound), 800-Ohms	8133–501
102209	**2a**	**Coil** (Single Wound), 1300-Ohms	8133–501
228419	**2b**	**Coil** (Single Wound), 100-Ohms	8133-501
104629	**3**	**Coil** (Double Wound), 625-Ohms each winding	8133–514
28576	**4**	**Lock Washer**	8486–101
104628	**5**	**Connector**	8064–853
53227	**6**	**Lead**	B–9998–6
	7	**Tubing,** .118″ I.D.x.178″ O.D.x7¾″ long	
108942	**8**	**Relay Base**	C–16649–10
104657	**9**	**Armature and Magnet Assembly Complete** (Inc. 1-10, 1-11, 2-12, 2-13, 2-14, 1-15, 2-16, 4-17, 2-18, 1-19, 1-20, 2-21 and 1-22)	C–16677-1
229978	**9a**	**Armature and Magnet Assembly Complete** (Inc. 1-10, 1-11, 2-12, 2-13, 2-14, 1-15, 2-16, 4-17, 2-18, 1-19, 1-20, 2-21 and 1-22) For use in PP51-1 and PP51-2 Relay Combinations	C–16677-1
104655	**10**	**Pole Piece Assembly Complete** (Inc. 2-23, 4-24, 2-25 and 1-26)	C–16677–2
104656	**11**	**Armature Assembly Complete** (Inc. 1-27, 2-28, 2-29 and 1-30)	C–16677–2
	12	**Machine Screw,** No. 8-36x⅝″ Fil. Hd. Br.	
104626	**13**	**Permanent Magnet**	12586–16
102159	**14**	**Strap**	12538–184
102187	**15**	**Calibration Tag Clip**	11893–843
208706	**16**	**Lock Washer**	8486–399
208668	**17**	**Screw**	8098–701
176319	**18**	**Dowel Pin**	8097–409

Details of Style "PP-51" D. C. Polar Relays

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102192	**19**	**Operating Arm Bracket**	12748–7
225023	**20**	**Lock Washer**	8486–432
225022	**21**	**Screw**	8098–1300
225026	**22**	**Armature Position Indicator**	12748–29
102156	**23**	**Pole Piece**	8250–111
105417	**24**	**Pin**	8097–567
102147	**25**	**Stop Pin**	8097–567
104654	**26**	**Mounting Bracket**	C–16649–4
104621	**27**	**Armature Complete**	8157–446
102162	**28**	**Pivot Screw**	8378–376
159815	**29**	**Lock Washer**	8486–395
104439	**30**	**Armature Bracket**	8303–131
	31	**Machine Screw,** No. 14-24x1⅜″ Fil. Hd. S.	
108933	**32**	**Contact Block Complete,** 4R Contacts (Silver Imp. Carbon) and 4H Contacts (Silver; for N and R) (Inc. 1-36, 4-37, 4-39 and 16-40)	C–16649–9
109004	**33**	**Contact Block Complete,** 4N Contacts (Silver Imp. Carbon) and 4R Contacts (Silver Imp. Carbon) (Inc. 1-36, 4-37, 4-38 and 16-40)	C–16649–9
109006	**34**	**Contact Block Complete,** 4H Contacts (Silver; for R and N) and 4N Contacts (Silver Imp. Carbon) (Inc. 1-36, 4-39, 4-38 and 16-40)	C–16649–9
109005	**35**	**Contact Block Complete,** 3R Contacts (Silver Imp. Carbon) and 4H Contacts (Silver; for N and R) (Inc. 1-36, 3-37, 4-39 and 14-40)	C–16649–9
108932	**36**	**Contact Block** with molded-in fingers but no contact springs	C–16649–11
102197	**37**	**Reverse Contact Spring** with Silver Imp. Carbon Tip	8385–2569

Details of Style "PP-51" D. C. Polar Relays

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

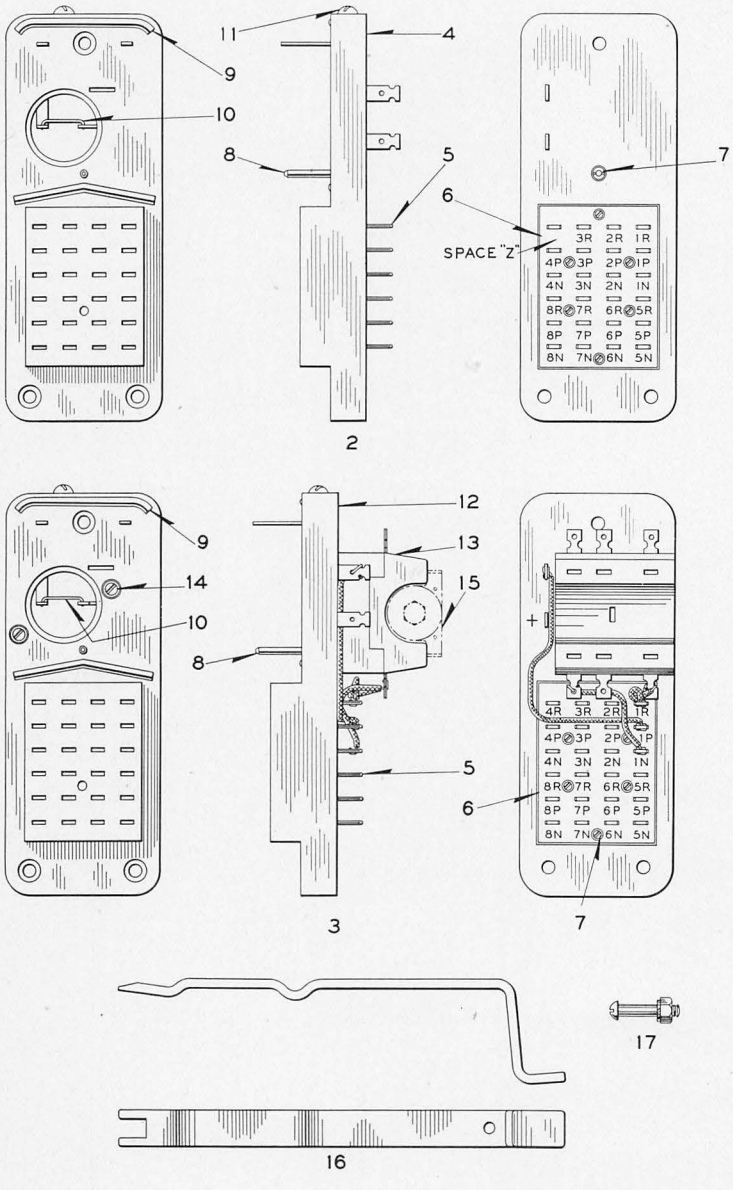
Piece	Ref.	Description	Drawing Reference
104622	**38**	**Normal Contact Spring** with Silver Imp. Carbon Tip.	8385–2569
102205	**39**	**Heel Contact Spring** with Silver Tips (Inc. 1-39a, 2-40, 2-73, 1-74 and 1-75)	8385–2573
102203	**39a**	**Contact Spring Only**	8385–2572
37417	**40**	**Rivet**	10301–21
	41	**Machine Screw,** No. 6-40x$\frac{7}{16}$" Fil. Hd. S.	
	42	**Index Pin,** Ref. 42a, with Nut Ref. 42b and No. 6 Lock Washer	8097–767
108948	**42a**	**Index Pin Only**	8097–767
104618	**42b**	**Nut**	8109–497
102229	**43**	**Clamping Plate**	8750–2821
232027	**44**	**Operating Arm**	12770–40
	44a	**Operating Arm** with Pins and Bushings (not assembled) for replacement of old single piece operating arm (Inc. 1-44, 2-47 and 4-48)	12770–
210445	**45**	**Pivot Pin**	8097–852
102181	**46**	**Washer**	7828–401
232031	**47**	**Pin**	8097–973
232030	**48**	**Bushing**	12770–42
	49	**Machine Screw,** No. 4-48x$\frac{3}{8}$" Flat Hd. S.	
	50	**Machine Screw,** No. 14-24x1$\frac{1}{4}$" Fil. Hd. S.	
	51	**Machine Screw,** No. 4-48x$\frac{1}{4}$" Fil. Hd. S.	
57497	**52**	**Dowel Pin**	8097–872
102135	**53**	**Latch Pin**	8097–760
102152	**54**	**Coil Spring**	8124–263

Details of Style "PP-51" D. C. Polar Relays

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102148	**55**	**Collar**	8350–901
54928	**56**	**Rivet**	10301–21
102176	**57**	**Receptacle Spring** for Coil Connection	8385–2552
102126	**58**	**Cover Plate**	8750–2820
102164	**59**	**Core**	8101–392
	60	**Cap Screw,** $\frac{1}{4}$"-20x$\frac{11}{16}$" Hex. Hd. S.	
104616	**61**	**Name Plate**	8225–524
	62	**Screw,** No. 4x$\frac{1}{4}$" Rd. Hd. Hardened	
102127	**63**	**Gasket**	8078–1652
102139	**64**	**Cover Glass**	C–16649–3
211511	**65**	**Spacer**	8350–856
108725	**66**	**Gasket** ($\frac{1}{32}$" thick)	8078–1691
108726	**66a**	**Gasket** ($\frac{1}{16}$" thick)	8078–1691
114106	**67**	**Washer**	7828–339
104612	**68**	**Handle Complete**	8311–112
102179	**69**	**Screw**	8190–405
152702	**70**	**Seal** with 6" of seal wire	8988–33
208930	**71**	**Screw**	8098–1300
102169	**72**	**Washer**	7828–401
102193	**73**	**Operating Clip**	8735–883
102143	**74**	**Contact Tip** (Silver)	8341–245
102144	**75**	**Contact Tip** (Silver)	8341–245



Mounting Bases for "PP-51" Relays

Style "PP-51" D. C. Polar Relay

Detail Parts

Mounting Bases

See Plate E-5385 for complete Relays and Plate E-5386 for relay details.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
106690	**2**	**Mounting Base Complete,** for use with "PP-51" Relay Ref. A, Plate E-5385 having 8N-8R Contacts	C–16655–4
104659	**2a**	**Mounting Base Complete,** for use with "PP-51" Relay Ref. B, Plate E-5385 having 8N-7R Contacts	C–16655–4
228548	**3**	**Mounting Base Complete** (Rectifier Ref. 15 should be ordered separately) for use with "PP-51" Relay Ref. C, Plate E-5385 in "PP51-1" and "PP51-2" Relay Combinations	C–16655–5
104653	**4**	**Mounting Base** for Refs. 2 and 2a	C–16649–8
102172	**5**	**Receptacle Spring**	8385–2550
106691	**6**	**Clamping Plate** for Refs. 2 and 3 (Marked 4R in Space "Z")	8750–2897
104627	**6a**	**Clamping Plate** for Ref. 2a (Marked C in Space "Z")	8750–2897
	7	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. with No. 4 Pl. S. Lock Washer ($\frac{1}{32}$"x$\frac{1}{32}$")	
	8	**Index Pin,** Ref. 8a, with Nut Ref. 8b and No. 6 Lock Washer	8097–767
104617	**8a**	**Index Pin Only**	8097–767
104618	**8b**	**Nut**	8109–497
102239	**9**	**Gasket**	8078–1654
	10	**Wire,** No. 13 Bare Tinned Copper (1½" long)	
	11	**Machine Screw,** No. 14-24x¼" Rd. Hd. Br.	
228544	**12**	**Mounting Base for Ref. 3**	C–16649–8
228547	**13**	**Rectifier Mounting Base Complete**	B–12818–1
	14	**Machine Screw,** No. 8-36x1¼" Fil. Hd. S. with No. 8 Lock Washer	
228553	**15**	**Rectifier** for 12 Volt Circuit	12746–13

Style "PP-51" D. C. Polar Relay

Detail Parts

Mounting Bases

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102238	**16**	**Test and Lock Lever** (Same as for "PN-50")	A–2586–25
	17	**Machine Screw,** $\frac{1}{4}$"-20x1$\frac{1}{8}$" Rd. Hd. S. with $\frac{1}{4}$" Pl. S. Lock Washer ($\frac{3}{32}$"x$\frac{1}{16}$") and $\frac{1}{4}$"-20 Hex. S. Nut. For attaching Relay Mounting Bases to Rack	

Remove Staple Before Filing Pages in Loose Leaf Covers

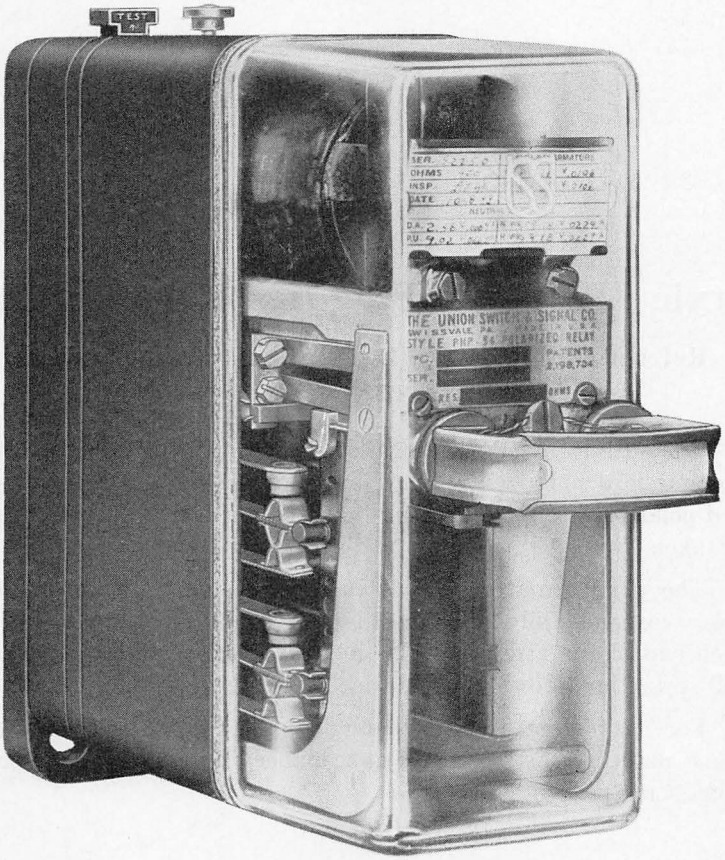
Style "PNP-54" Plug-In Polarized Relay

(Refer also to "General Description" of Plug-In Relays Plate E-5340)

The "PNP-54" Polarized Relay is the plug-in counterpart of the standard polarized relay. This relay has both neutral (4F-4B) and polar (4N-4R) contacts and mounts in a single relay space such as taken by the "PN-50" or "PP-51" relay.

The polar armature is held in its last energized position with polar contacts fully compressed by permanent magnets, one at each end of the armature. The neutral armature is provided with coil spring hold-down. Both armatures have position indicators.

For easy identification this relay is provided with a yellow name plate, to distinguish it at a glance from the other types of plug-in relays.



Dimensions of Relay without Mounting Base:
Height $8\frac{9}{64}$″ (Including Locking Device)
Width $3\frac{1}{4}$″
Depth $9\frac{9}{32}$″ (Including Handle)

Dimensions of Mounting Base will be found on Plate E-5402.

Style "PNP-54" D. C. Polarized Relays

Style "PNP-54" D. C. Polarized Relays

Unless otherwise specified Relays will be furnished with Silver to Silver Imp. Carbon Front and Silver to Silver Back Neutral Contacts and Silver to Silver Imp. Carbon Normal and Reverse Polar Contacts.

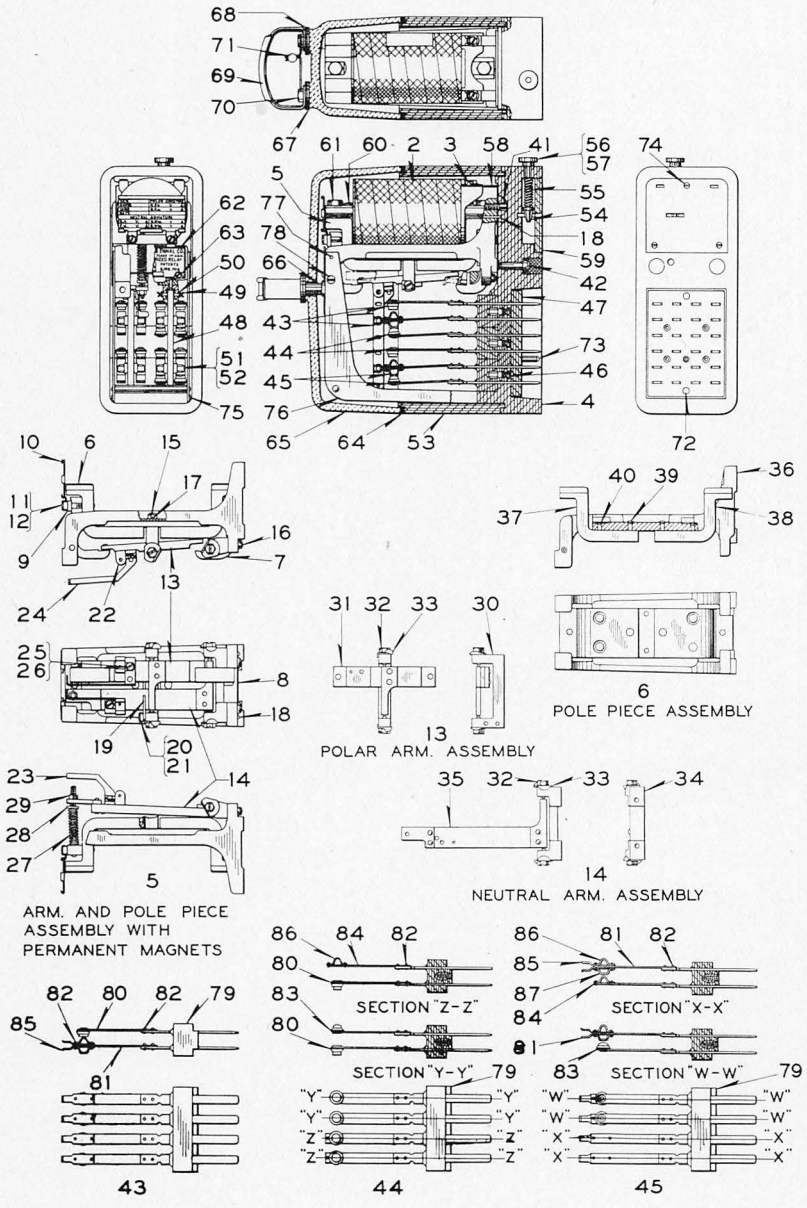
Orders should specify resistance of Coils or voltage across Relay winding.

For details see Plate E-5401.

Relays do not include Mounting Bases, assemblies and details of which are shown on Plate E-5402.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "PNP-54" D.C. Polarized Relay** with 4F-4B L.V. Neutral and 4N-4R Polar Contacts and ..... -Ohms Coil.....	C–16796–3



Details of Style "PNP-54" D. C. Polarized Relays

Details of "PNP-54" D. C. Polarized Relay

For Relays complete refer to Plate E-5400

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
219876	**2**	**Coil,** 240-Ohms	8133–501
102210	**2a**	**Coil,** 400-Ohms	8133–501
102214	**2b**	**Coil,** 550-Ohms	8133–501
28576	**3**	**Bolt Lock**	8486–101
226586	**4**	**Relay Base**	C–16649–13
226771	**5**	**Armature and Pole Piece Assembly with Permanent Magnets Complete** (Inc. 1-6, 2-7, 1-8, 1-9, 1-10, 2-11, 4-12, 1-13, 1-14, 2-15, 2-16, 2-17, 2-18, 1-19, 1-20, 2-21, 2-22, 1-23, 1-24, 2-25, 2-26, 1-27, 1-28 and 1-29)	C–16797–1
226770	**6**	**Pole Piece Assembly** (Inc. 1-36, 1-37, 1-38, 3-39 and 3-40)	C–16797–2
226757	**7**	**Permanent Magnet**	12586–22
226748	**8**	**Clamp** for Rear Magnet	12538–249
226758	**9**	**Clamp** for Front Magnet	12538–249
102187	**10**	**Calibration Tag Clip**	11893–843
208706	**11**	**Bolt Lock**	8486–399
208668	**12**	**Screw**	8098–701
226769	**13**	**Polar Armature Complete** (Inc. 1-30, 1-31, 2-32 and 2-33)	C–16797–2
226768	**14**	**Neutral Armature Complete** (Inc. 2-32, 2-33, 1-34 and 1-35)	C–16797–2
	15	**Machine Screw,** No. 8-36x$\frac{9}{16}$" Fil. Hd. Br. (N.P.).	
	16	**Machine Screw,** No. 8-36x$\frac{5}{8}$" Fil. Hd. Br. (N.P.).	
176319	**17**	**Dowel**	8097–409
57497	**18**	**Dowel**	8097–872
226763	**19**	**Armature Stop**	12748–31

Details of "PNP-54" D. C. Polarized Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
214138	**20**	**Bolt Lock**	8486–399
131239	**21**	**Screw**	8098–845
226755	**22**	**Operating Arm Bracket**	12748–30
226764	**23**	**Armature Position Indicator** (Red)	12748–32
226765	**24**	**Armature Position Indicator** (Green)	12748–32
231163	**25**	**Bolt Lock**	8486–428
225022	**26**	**Screw**	8098–1300
226751	**27**	**Spring**	8124–273
226746	**28**	**Spring Stud**	8114–992
32498	**29**	**Nut**	8109–223
226754	**30**	**Polar Armature Bracket**	8303–135
226762	**31**	**Polar Armature Complete**	8157–485
102162	**32**	**Pivot Screw**	8378–376
159815	**33**	**Bolt Lock**	8486–395
226753	**34**	**Neutral Armature Bracket**	8303–134
226760	**35**	**Neutral Armature Complete**	8157–484
226744	**36**	**Mounting Bracket**	C–16649–4
226766	**37**	**Pole Piece**	8250–129
226767	**38**	**Pole Piece**	8250–129
105417	**39**	**Pin**	8097–567
102147	**40**	**Stop Pin**	8097–567
	41	**Machine Screw,** No. 14-24x1¼" Fil. Hd. S. (Tin Pl.)	
	42	**Machine Screw,** No. 14-24x1⅜" Fil. Hd. S. (Tin Pl.)	

Details of "PNP-54" D. C. Polarized Relay

(**Continued**)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
108933	**43**	**Contact Block Complete,** 2F Contacts (Silver Imp. Carbon), 2R Contacts (Silver Imp. Carbon) and 4H Contacts (Silver; for F and B, N and R) (Inc. 1-79, 4-80, 4-81 and 16-82)	C–16649–9
226772	**44**	**Contact Block Complete,** 2B Contacts (Silver), 2N Contacts (Silver Imp. Carbon), 2F Contacts (Silver Imp. Carbon) and 2R Contacts (Silver Imp. Carbon) (Inc. 1-79, 4-80, 16-82, 2-83 and 2-84)	C–16649–12
226773	**45**	**Contact Block Complete,** 4H Contacts (Silver; for F and B, N and R), 2B Contacts (Silver) and 2N Contacts (Silver Imp. Carbon) (Inc. 1-79, 4-81, 16-82, 2-83 and 2-84)	C–16649–12
	46	**Machine Screw,** No. 6-40x$\frac{7}{16}$" Fil. Hd. S. (Tin Pl.).	
102229	**47**	**Clamping Plate**	8750–2821
232027	**48**	**Operating Arm**	12770–40
228040	**49**	**Pivot Pin**	8097–852
102181	**50**	**Washer**	7828–401
232031	**51**	**Pin**	8097–973
232030	**52**	**Bushing**	12770–42
236325	**53**	**Cover Shell**	C–16649–17
102135	**54**	**Latch Pin**	8097–760
102152	**55**	**Coil Spring**	8124–263
102148	**56**	**Collar**	8350–901
54928	**57**	**Rivet** for attaching Collar to Latch Pin	10301–21
102176	**58**	**Receptacle Spring** for Coil Connection	8385–2552
102126	**59**	**Cover Plate**	8750–2820
102164	**60**	**Core**	8101–392
	61	**Cap Screw,** $\frac{1}{4}$"-20x$\frac{11}{16}$" Hex. Hd. S. (Tin Pl.).	

Details of "PNP-54" D. C. Polarized Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

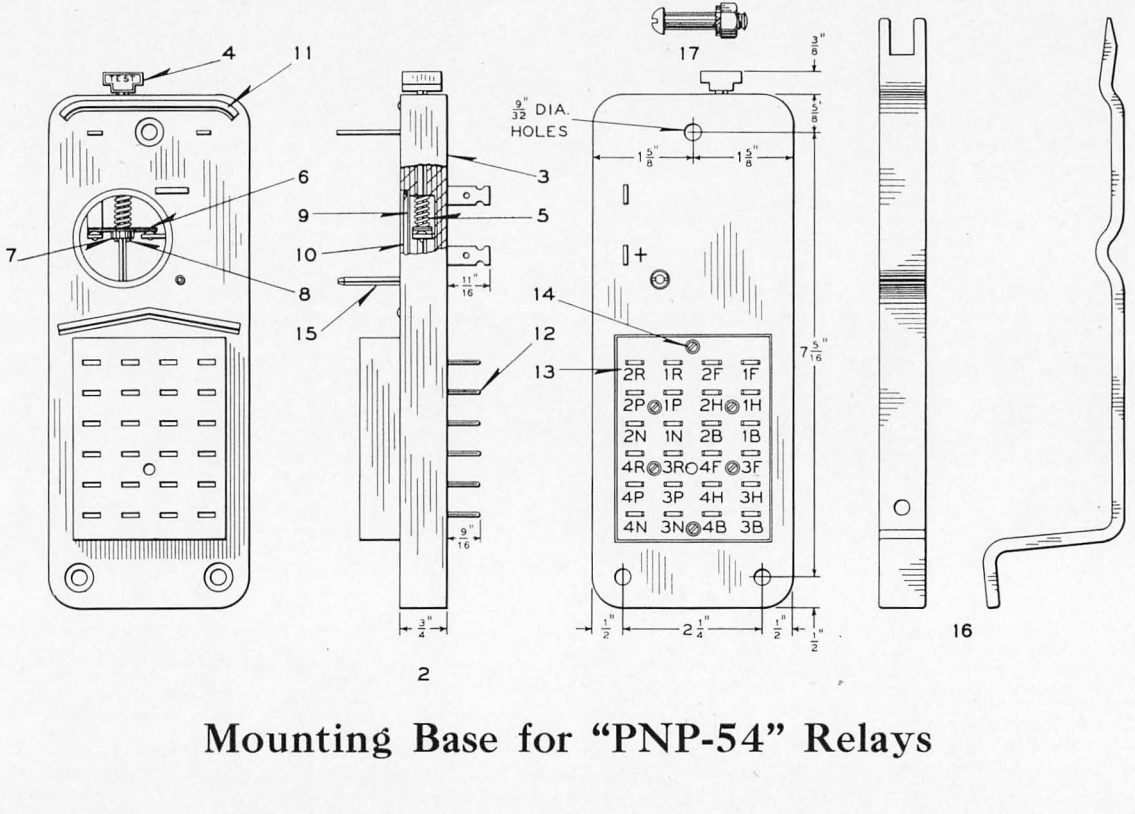
Piece	Ref.	Description	Drawing Reference
228042	**62**	**Name Plate**	8225–595
	63	**Screw,** No. 4x¼" Rd. Hd. (Tin Pl.).	
236361	**64**	**Gasket**	8078–1734
236356	**65**	**Cover Glass**	C–16649–18
211511	**66**	**Spacer**	8350–856
108725	**67**	**Gasket** (1/32" thick)	8078–1691
108726	**67a**	**Gasket** (1/16" thick)	8078–1691
114106	**68**	**Washer**	7828–339
104612	**69**	**Handle Complete**	8311–112
102179	**70**	**Screw**	8190–405
152702	**71**	**Seal** with 6" of seal wire	8988–33
	72	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. (Tin Pl.).	
	73	**Index Pin,** Ref. 73a, with Nut Ref. 73b and No. 6 Lock Washer (Tin Pl.)	8097–767
108948	**73a**	**Index Pin Only**	8097–767
104618	**73b**	**Nut**	8109–497
	74	**Machine Screw,** No. 4-48x⅜" Flat Hd. S. (Tin Pl.).	
238324	**75**	**Pin**	8097–950
237669	**76**	**Auxiliary Support Complete**	C–16797–3
57496	**77**	**Pin**	8097–872
	78	**Machine Screw,** No. 6-40x⅜" Flat Hd. S. (Tin Pl.)	
237456	**79**	**Contact Block** with molded-in fingers but without contact springs	C–16649–11
102197	**80**	**Front or Reverse Contact Spring** with Silver Imp. Carbon Tip	8385–2569

Details of "PNP-54" D. C. Polarized Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102205	**81**	**Heel Contact Spring with Silver Tips** (Inc. 1-81a, 2-82, 2-85, 1-86 and 1-87)	8385–2573
102203	**81a**	**Contact Spring Only**	8385–2572
37417	**82**	**Rivet**	10301–21
104622	**83**	**Normal Contact Spring** with Silver Imp. Carbon Tip	8385–2569
102215	**84**	**Back Contact Spring** with Silver Tip (Inc. 1-84a, 2-82 and 1-86)	8385–2575
102204	**84a**	**Contact Spring Only**	8385–2572
102193	**85**	**Contact Operating Clip**	8735–883
102143	**86**	**Contact Tip** (Silver)	8341–245
102144	**87**	**Contact Tip** (Silver)	8341–245



Mounting Base for "PNP-54" Relays

Style "PNP-54" D. C. Polarized Relay

Detail Parts

Mounting Base

See Plate E-5400 for complete Relays and Plate E-5401 for relay details.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
226553	**2**	**Mounting Base Complete,** for use with "PNP-54" Relay	C–16655–9
226549	**3**	**Mounting Base** for Ref. 2	C–16649–2
219795	**4**	**Contact Breaker Complete**	8750–2825
102154	**5**	**Coil Spring**	8124–263
102150	**6**	**Contacting Bar**	8341–246
208606	**7**	**Washer**	8112–66
	8	**Brass Cotter,** $\frac{1}{16}$"x$\frac{1}{4}$".	
102145	**9**	**Glass**	8163–316
102180	**10**	**Retaining Spring**	8124–262
102239	**11**	**Gasket**	8078–1654
102172	**12**	**Receptacle Spring**	8385–2550
226555	**13**	**Clamping Plate**	8750–3020
	14	**Machine Screw,** No. 4-48x$\frac{1}{4}$" Fil. Hd. S. with No. 4 Pl. S. Lock Washer ($\frac{1}{32}$"x$\frac{1}{32}$").	
	15	**Index Pin,** Ref. 15a, with Nut Ref. 15b and No. 6 Lock Washer (Int. Teeth)	8097–767
104617	**15a**	**Index Pin Only**	8097–767
104618	**15b**	**Nut**	8109–497
102238	**16**	**Test and Lock Lever** (Same as for "PN-50")	A–2586–25
	17	**Machine Screw,** $\frac{1}{4}$"-20x1$\frac{1}{8}$" Rd. Hd. S. with $\frac{1}{4}$" Pl. S. Lock Washer ($\frac{3}{32}$"x$\frac{1}{16}$") and $\frac{1}{4}$"-20 Hex. S. Nut. For attaching Relay Mounting Bases to Rack	

"PT-52" Plug-In Thermal Relay

(Refer to "General Description" of Plug-In Relays, Plate E-5340 and Plate E-5225 for "TH-10" Thermal Relays).

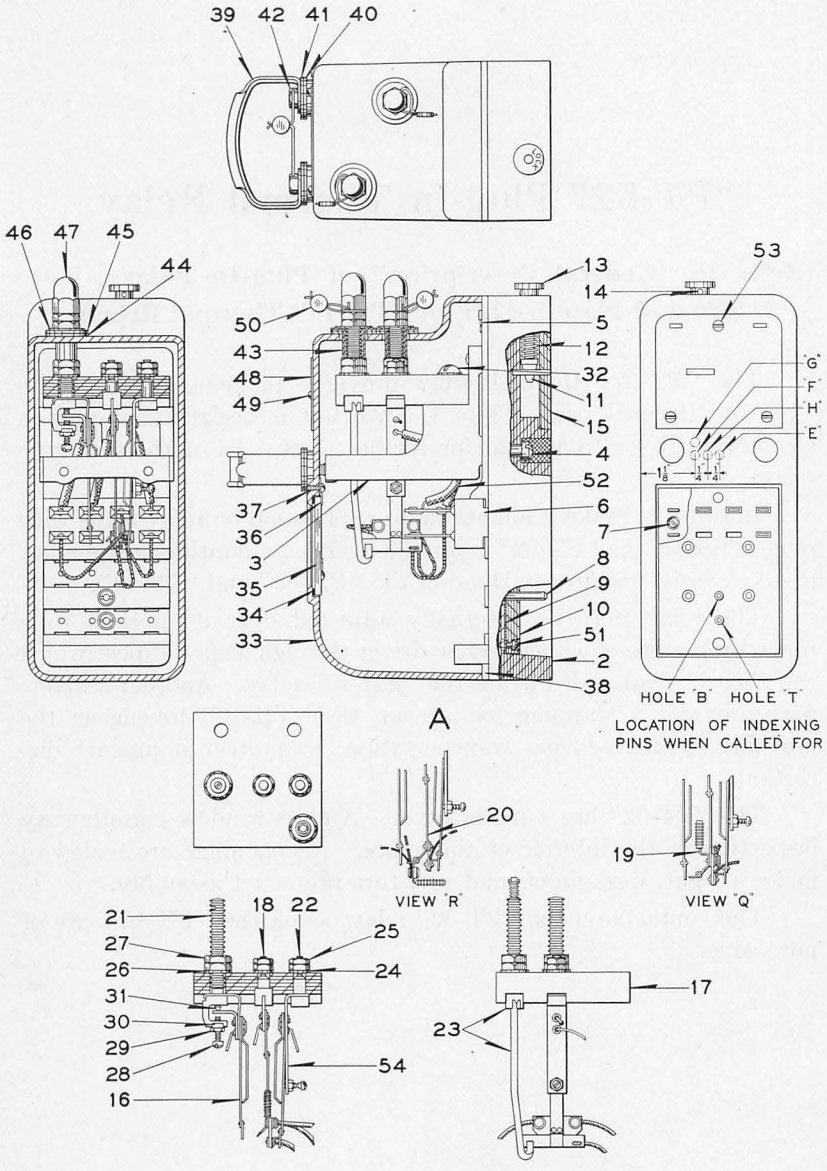
The "PT-52" thermal relay provides the equivalent of the "TH-10" thermal relay, Plate E-5225, but is designed for plug-in assembly. Refer to E-5225 for further discussion of thermal type relays.

In order to make it adaptable to application on relay racks with plug-in relays, the "PT-52" is provided with a mounting base similar in all essential features to those of the "PN-50" and "PP-51".

The relay may be externally adjusted over its normal time range by the use of a small screw driver through a special post which can then be lead-sealed as on the "TH-10" relay. Another sealable post provides a shipping lock as on the "TH-10" to engage the movable element during transportation, to protect it against distortion.

The "PT-52" has a metal cover. A glass window permits easy inspection of the interior of this relay. All openings are sealed to make a tight, dust-proof, and moisture-protected assembly.

The contacts on the "PT-52" relay, as on the "TH-10", are of pure silver.



Style "PT-52" Thermal Relay

Style "PT-52" Thermal Relay

If operating voltage other than those listed is required, the order should specify the operating voltage if A.C. or number and type of battery cells if D.C. The relay will be shipped adjusted for any specified "Total" operating time within the range shown below for respective assemblies.

Assemblies and details of Mounting Bases are shown on Plate E-5412.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

STYLE "PT-52" THERMAL RELAY COMPLETE, DWG, C-16678-2

Piece	Ref.	Volts	Ohms Res.	Time Ranges Obtainable With Front Contact Adjustment		Thermal Contact Assembly Ref.	Base Ref.	Clamping Plate Ref.
				*Front Cont. Time	**Total Oper. Time			
108947	**A**	10	10	25″–35″	110″–135″	18	2	10
229410	**Aa**	12	15	10″–18″	45″– 70″	18a	2a	10a
229411	**Ab**	12	15	15″–27″	70″–100″	18b	2b	10a
230166	**Ac**	12	15	25″–35″	110″–135″	18c	2	10
232432	**Ad**	12	15	35″–55″	140″–185″	19 (Per View "Q")	2c	10a
232583	**Ae**	12	15	60″–80″	180″–220″	20 (Per View "R")	2d	10a

*"Front Contact Time" is the time from the instant energy is applied to the heater coil until front contact closes.

**"Total Operating Time" is the time from the instant energy is applied to the heater coil until the back contact recloses. This occurs after the action of the thermal element closes the front contact and some relay thus picked up opens the heater coil circuit and permits the thermal element to cool and reclose the back contact.

Piece	Ref.	Description	Drawing Reference
108940	**2**	**Base Complete** with Hole "B"	C–16649–10
227858	**2a**	**Base Complete** with Holes "T", "B", and "E"	C–16649–13
227859	**2b**	**Base Complete** with Holes "T", "B" and "F"	C–16649–13
232435	**2c**	**Base Complete** with Holes "T" and "G"	C–16649–13
232592	**2d**	**Base Complete** with Holes "T" and "H"	C–16649–13
104416	**3**	**Terminal Board Bracket**	C–16679–1
	4	**Machine Screw,** No. 14-24x1⅛″ Fil. Hd. S.	

Style "PT-52" Thermal Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
104614	**5**	**Plug**	11893–863
108997	**6**	**Contact Block**	C–16649–11
	7	**Machine Screw**, No. 6-40x$\frac{7}{16}$" Fil. Hd. S.	
	8	**Index Pin**, Ref. 8a, with Nut Ref. 8b and No. 6 Steel Lock Washer	8097–767
108948	**8a**	**Index Pin Only**	8097–767
104618	**8b**	**Nut**	8109–497
104609	**9**	**Insulation**	8750–2894
102229	**10**	**Clamping Plate** with Hole "V"	8750–2821
227857	**10a**	**Clamping Plate** with Holes "T" and "V"	8750–3060
102135	**11**	**Latch Pin**	8097–760
102152	**12**	**Coil Spring**	8124–263
102148	**13**	**Collar**	8350–901
54928	**14**	**Rivet**	10301–21
102126	**15**	**Cover Plate**	8750–2820
211372	**16**	**Front Contact Complete**	8385–2360
104597	**17**	**Terminal Board**	9968–1240

Thermal Contact Assembly Including Heating Coil, Terminal Post, Flexible Leads

Piece	Ref.	Ohms Resis.	For Use With Ref.	Drawing Reference
104602	**18**	10	A	9065–280
229412	**18a**	15	Aa	9065–280
229413	**18b**	15	Ab	9065–280
230164	**18c**	15	Ac	9065–280
233122	**19**	15	Ad	9065–314
232591	**20**	15	Ae	9065–311

Style "PT-52" Thermal Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

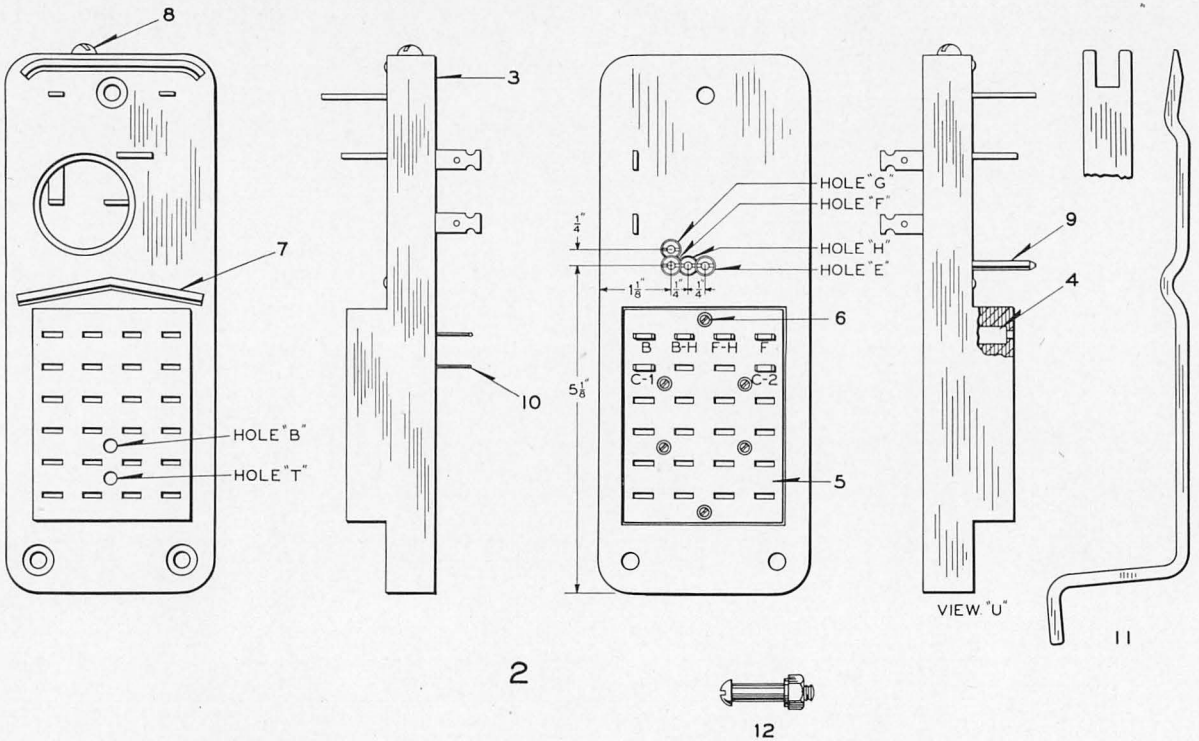
Piece	Ref.	Description	Drawing Reference
	21	**Terminal Post** with Nuts and Washer (Inc. 1-21a, 1-26 and 2-27)	12451–
183493	21a	**Terminal Post Only**	8094–2316
	22	**Terminal Post** with Nuts and Washer (Inc. 1-22a, 1-24 and 2-25)	12451–
104603	22a	**Terminal Post Only**	8094–2379
	23	**Shipping Lock** with Nuts and Washer (Inc. 1-23a, 1-26 and 2-27)	12451–
194857	23a	**Shipping Lock Complete** (Without Nuts and Washer)	8094–2348
83	24	**Washer**	7828–3
44230	25	**Nut**	8109–281
183633	26	**Washer**	7828–376
183600	27	**Nut**	8109–38
	28	**Machine Screw,** No. 6-40x½″ Fil. Hd. Br. with Nut Ref. 29 and Nut Lock Ref. 30	
30456	29	**Nut**	8109–212
134516	30	**Nut Lock**	8486–368
183637	31	**Adjusting Screw**	8098–1102
	32	**Machine Screw,** No. 14-24x1″ Rd. Hd. S. with ¼″ Steel Lock Washer	
104607	33	**Cover Complete** (Inc. 1-33a, 1-34, 1-35, 3-36 and 3-37)	C–16679–2
104417	33a	**Cover Only**	C–16679–2
211361	34	**Gasket**	8078–1503
104598	35	**Glass Shield**	8163–322
104608	36	**Clip**	11893–862

Style "PT-52" Thermal Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	37	**Machine Screw,** No. 4-48x¼" Rd. Hd. S.	
102127	38	**Gasket**	8078–1652
104612	39	**Handle Complete**	8311–112
108726	40	**Gasket**	8078–1691
114106	41	**Washer**	7828–339
102179	42	**Screw**	8190–405
211408	43	**Ins. Bushing**	B–10271–1
211406	44	**Cork Washer**	8078–1503
211407	45	**Micarta Washer**	8078–1655
74918	46	**Washer**	7826–83
183638	47	**Nut**	8109–471
104594	48	**Name Plate**	8225–523
	49	**Screw,** No. 4x$\frac{3}{16}$" Rd. Hd. Hardened	
152702	50	**Seal,** with wire (Orders should specify length of seal wire desired)	8988–33
	51	**Machine Screw,** No. 4-48x¼" Fil. Hd. S.	
	52	**Tubing,** .118" I.D.x.178" O.D.x2¾" long	
	53	**Machine Screw,** No. 4-48x⅜" Flat Hd. S.	
104604	54	**Back Contact Complete**	8385–2592



Mounting Bases for "PT-52" Relays

Style "PT-52" Thermal Relay

Detail Parts

Mounting Base

See Plate E-5411 for assemblies and details of "PT-52" Relays.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
104658	**2**	**Mounting Base Complete,** for use with "PT-52" Relay having 110-135 seconds total operating time (With Hole "B")	C–16655–3
229414	**2a**	**Mounting Base Complete,** for use with "PT-52" Relay having 45-70 seconds total operating time (With Holes "T" and "B" and Indexing Pin Ref. 9 per View "U" in Hole "E")	C–16655–3
229415	**2b**	**Mounting Base Complete,** for use with "PT-52" Relay having 70-100 seconds total operating time (With Holes "T" and "B" and Indexing Pin Ref. 9 per View "U" in Hole "F")	C–16655–3
232436	**2c**	**Mounting Base Complete,** for use with "PT-52" Relay having 140-185 seconds total operating time (With Hole "T" and Indexing Pin Ref. 9 per View "U" in Hole "G")	C–16655–3
232587	**2d**	**Mounting Base Complete,** for use with "PT-52" Relay having 180-220 seconds total operating time (With Hole "T" and Indexing Pin Ref. 9 per View "U" in Hole "H")	C–16655–3
104652	**3**	**Mounting Base Only,** with Hole "B" for Ref. 2	C–16649–7
229425	**3a**	**Mounting Base Only,** with Holes "T", "B" and "E" for Ref. 2a	C–16649–7
229426	**3b**	**Mounting Base Only,** with Holes "T", "B" and "F" for Ref. 2b	C–16649–7
232437	**3c**	**Mounting Base Only,** with Holes "T" and "G" for Ref. 2c	C–16649–7
232593	**3d**	**Mounting Base Only,** with Holes "T" and "H" for Ref. 2d	C–16649–7
104596	**4**	**Plug**	8750–2890
104613	**5**	**Clamping Plate**	8750–2896
	6	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. with No. 4 Pl. S. Lock Washer ($\frac{1}{32}$"x$\frac{1}{32}$")	

Style "PT-52" Thermal Relay

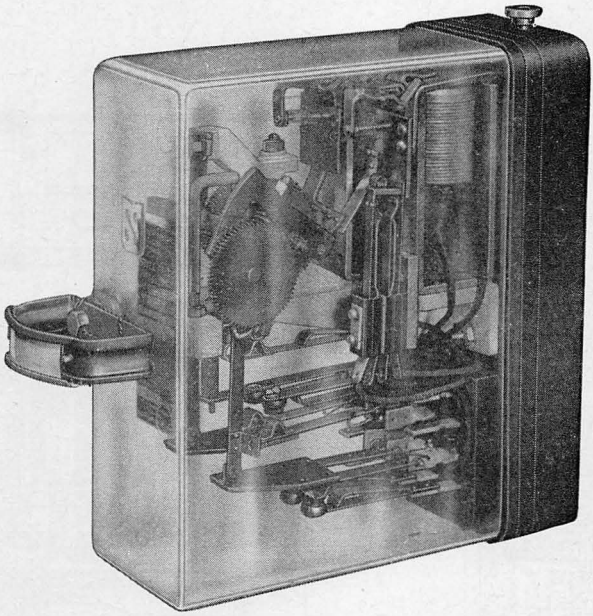
Detail Parts

Mounting Base

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

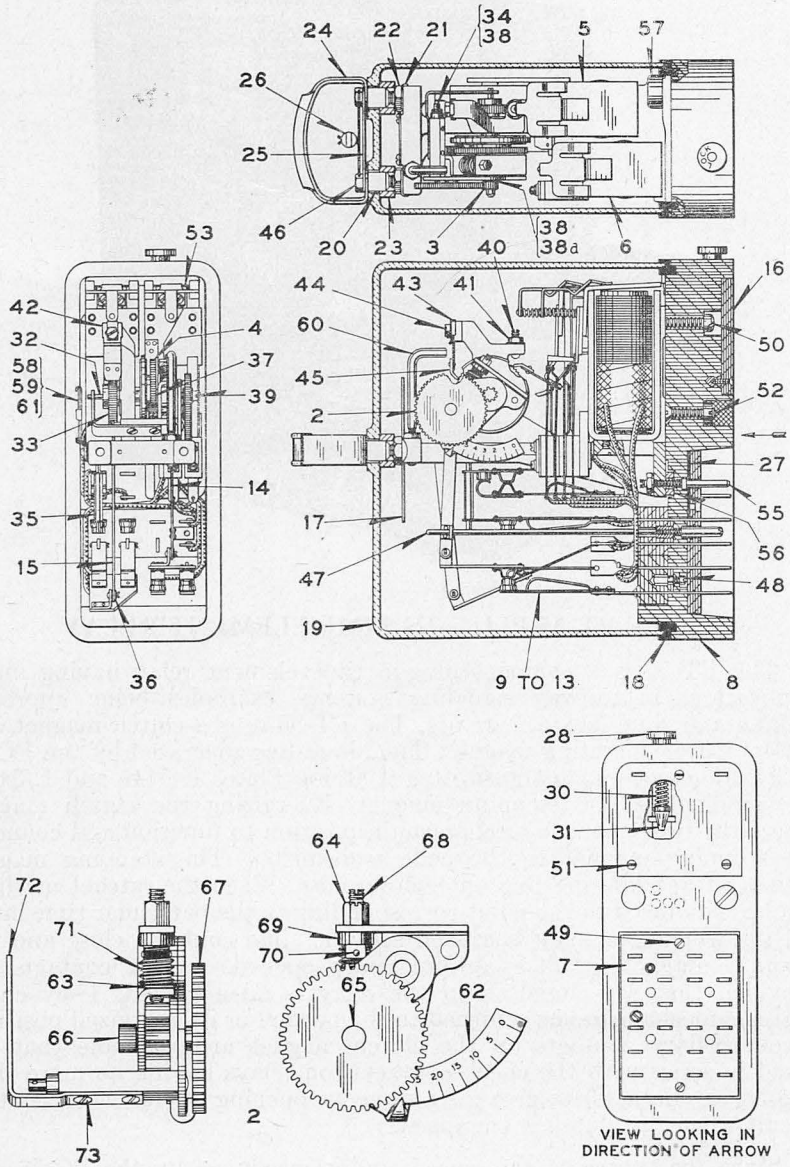
Piece	Ref.	Description	Drawing Reference
102239	**7**	**Gasket**	8078–1654
	8	**Machine Screw,** No. 14-24x¼" Rd. Hd. Br.	
	9	**Index Pin,** Ref. 9a, with Nut Ref. 9b and No. 6 Steel Lock Washer	8097–767
104617	**9a**	**Index Pin Only**	8097–767
104618	**9b**	**Nut**	8109–497
102172	**10**	**Receptacle Spring**	8385–2550
102238	**11**	**Test and Lock Lever** (Same as for "PN-50")	A–2586–25
	12	**Machine Screw,** ¼"-20x1⅛" Rd. Hd. S. with ¼" Pl. S. Lock Washer ($\frac{3}{32}$"x$\frac{1}{16}$") and ¼"-20 Hex. S. Nut For attaching Relay Mounting Bases to Rack	



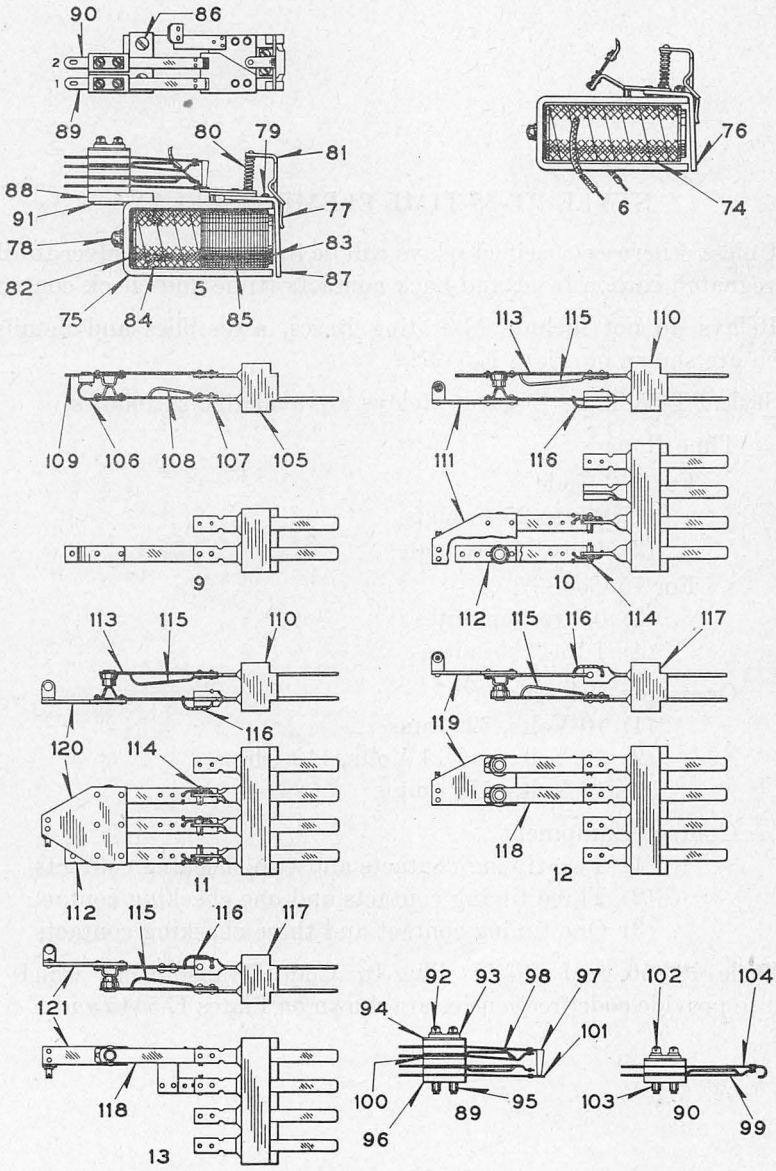
STYLE PT-55 PLUG-IN TIME ELEMENT RELAY

The PT-55 is a compact plug-in time element relay having many applications in railway signaling systems, examples being approach locking and time locking circuits. The PT-55 uses a clutch magnet and a stepping or operating magnet. Time impulses generated by the PC-56 or PC-57 plug-in code transmitter (Catalog Plates E-5445 and E-5446) are supplied to the stepping magnet. Energizing the clutch magnet places the time element mechanism in position to function and connects the stepping magnet to the code transmitter. The stepping magnet actuates a ratchet one step on each impulse. When the ratchet mechanism has advanced to the point corresponding to the particular time interval for which the relay has been set, the time contacts close and the stepping magnet circuit is automatically opened. Check contacts are provided that are closed when the relay is de-energized. They check that the mechanism has returned to the normal or de-energized position. Two auxiliary contacts on the clutch magnet are available that are wired in series with the check contacts (on relays having no more than two check contacts) to give instantaneous opening of the check contact circuit when the clutch is energized.

Since the timing of the code impulses produced by the PC-56 and PC-57 code transmitters is practically unaffected by either temperature or voltage, the time interval of the PT-55 relay is similarly unaffected by these factors. The PT-55 relay is particularly suitable for applications where highly accurate time intervals are required.



Style "PT-55" Time Element Relay



Style "PT-55" Time Element Relay

STYLE PT-55 TIME ELEMENT RELAY

Unless otherwise specified relays will be furnished with silver to silver impregnated carbon front and back contacts (time and check contacts).

Relays do not include Mounting Bases, assemblies and details of which are shown on Plate E-5427.

Style PT-55 Time Element Relays are available as follows:

Time Ranges

For 240 Code

(1) 2.5 to 25 seconds
(2) 10 to 120 seconds

For 75 Code

(3) 0.5 to 6 minutes
(4) 1 to 11 minutes

Operating Voltages

(1) 10 Volts, 72 Ohms
(2) 12 Volts and 14 Volts, 112 Ohms
(3) 16 Volts, 175 Ohms

Contact Equipment

(1) Two timing contacts and two checking contacts
(2) Three timing contacts and one checking contact
(3) One timing contact and three checking contacts

Style PC-56 and PC-57 Plug-In Code Transmitters which are used to provide code frequencies are shown on Plates E-5445 and E-5446.

Style "PT-55" Time Element Relay

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "PT-55" Time Element Relay** (Orders should specify Timing Range, Operating Voltage and Contact Equipment desired by referring to information given on opposite page)	C–16817–2
		Planetary Gear Train Complete **Drawing C-16818-2**	

Piece	Ref.	Segment Ref.	Shaft Ref.	Spur Gear Ref.	Pinion Ref.	Time Range
227877	**2**	62	65	67	66	2.5 to 25 Seconds
231647	**2a**	62a	65a	67a	66a	10 to 120 Seconds
231648	**2b**	62b	65a	67a	66a	0.5 to 6 Minutes
265423	**2c**	62c	65b	67a	66b	1 to 11 Minutes

Piece	Ref.	Description	Drawing Reference
162000	**3**	**Pinion** for 2.5 to 25 Seconds time range	8424–260
160844	**3a**	**Pinion** for 10 to 120 Seconds and 0.5 to 6 Minutes time ranges	8424–259
265427	**3b**	**Pinion** for 1 to 11 Minutes time range	8424–312
160836	**4**	**Brake Wheel Complete** for 2.5 to 25 Seconds time range	8424–258
181102	**4a**	**Brake Wheel Complete** for 10 to 120 Seconds, 0.5 to 6 Minutes and 1 to 11 Minutes time ranges	8424–270
227870	**5**	**Clutch Relay Complete,** 150-Ohm Coil	C–16818–1
232152	**5a**	**Clutch Relay Complete,** 100-Ohm Coil	C–16818–1

Style "PT-55" Time Element Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
232153	**5b**	**Clutch Relay Complete,** 65-Ohm Coil	C–16818–1
227815	**6**	**Operating Magnet Complete,** 175-Ohm Coil	C–16818–6
232134	**6a**	**Operating Magnet Complete,** 112-Ohm Coil	C–16818–6
232135	**6b**	**Operating Magnet Complete,** 72-Ohm Coil	C–16818–6
227863	**7**	**Clamping Plate**	8750–3060
231590	**8**	**Base** for Relay having 2F Time Contacts, 2B Check Contacts, 2.5 to 25 Seconds Time Range	C–16649–13
231591	**8a**	**Base** for Relay having 2F Time Contacts, 2B Check Contacts, 10 to 120 Seconds Time Range	C–16649–13
231592	**8b**	**Base** for Relay having 2F Time Contacts, 2B Check Contacts, 0.5 to 6 Minutes Time Range	C–16649–13
233132	**8c**	**Base** for Relay having 3F Time Contacts, 1B Check Contact, 2.5 to 25 Seconds Time Range	C–16649–13
265428	**8d**	**Base** for Relay having 2F Time Contacts, 2B Check Contacts, 1 to 11 Minutes Time Range	C–16649–13
269406	**8e**	**Base** for Relay having 3F Time Contacts, 1B Check Contact, 10 to 120 Seconds Time Range	C–16649–13
231635	**9**	**Contact Block Complete,** 1B Contact (Silver) and 1H Contact (Silver)	C–16818–4
231636	**10**	**Contact Block Complete,** 2F Contacts (Silver Imp. Carbon) and 2H Contacts (Silver)	C–16818–4
233130	**11**	**Contact Block Complete,** 3F Contacts (Silver Imp. Carbon) and 3H Contacts (Silver)	C–16818–5
231637	**12**	**Contact Block Complete,** 2B Contacts (Silver Imp. Carbon) and 2H Contacts (Silver)	C–16818–4
233131	**13**	**Contact Block Complete,** 1B Contact (Silver Imp. Carbon) and 1H Contact (Silver)	C–16818–5
227886	**14**	**Link Complete**	11893–962
227887	**15**	**Link**	11893–962

Style "PT-55" Time Element Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
102126	**16**	**Cover Plate**	8750–2820
231649	**17**	**Name Plate**	8225–609
263534	**18**	**Gasket**	8078–1779
263533	**19**	**Cover Glass**	C–16649–23
270642	**20**	**Limiting Stud**	8098–1497
253273	**21**	**Lock Washer**	7828–138
29103	**22**	**Nut**	8109–194
270643	**23**	**Compression Bushing**	8078–1792
104612	**24**	**Handle Complete**	8311–112
244341	**25**	**Locking Plate**	12538–281
	26	**Seal** Ref. 26a with 6 in. of seal wire	8988–33
152702	**26a**	**Seal Only**	8988–33
231596	**27**	**Insulation**	8750–3064
102148	**28**	**Collar**	8350–901
65245	**29**	**Rivet** (For attaching Collar to Latch Pin) (Not Shown)	10301–21
102152	**30**	**Coil Spring**	8124–263
102135	**31**	**Latch Pin**	8097–760
256639	**32**	**Shaft** for all time ranges except 1 to 11 Minutes	12501–183
265431	**32a**	**Shaft** for 1 to 11 Minutes Time Range	12501–183
160738	**33**	**Ratchet**	9121–136
	34	**S. Cotter,** $\frac{1}{32}$"x$\frac{3}{8}$" (C.N. 48670) (Tin Pl.).	
227884	**35**	**Operating Rod**	8750–3072
102181	**36**	**Washer**	7828–401

Style "PT-55" Time Element Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
83	**37**	**Washer**	7828–3
87225	**38**	**Washer**	7828–287
180655	**38a**	**Washer** for 1 to 11 Minutes Time Range	7828–176
156497	**39**	**Pin**	8097–409
265434	**39a**	**Pin** for 1 to 11 Minutes Time Range	8097–409
108584	**40**	**Screw**	8098–1134
26942	**41**	**Nut**	8109–184
254791	**42**	**Nut Lock**	8486–367
134516	**43**	**Nut Lock**	8486–368
62977	**44**	**Screw**	8098–845
108505	**45**	**Pawl Complete**	9121–182
244330	**46**	**Screw**	8098–1472
231633	**47**	**Shipping Screw**	8098–1461
281945	**48**	**Machine Screw** (Used in place of Shipping Screw when Relay is placed in service and for attaching Contact Blocks to Base)	8098–1513
	49	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. (C.N. 52236) (Tin Pl.).	
	50	**Machine Screw,** No. 14-24x1¼" Fil. Hd. S. (C.N. 52330) (Tin Pl.).	
	51	**Machine Screw,** No. 4-48x⅜" Flat Hd. S. (C.N. 52168) (Tin Pl.).	
	52	**Machine Screw,** No. 14-24x1" Flat Hd. S. (C.N. 52109) (Tin Pl.) with Nut Ref. 52a	
72948	**52a**	**Nut Only** for Ref. 52	8109–383
104614	**53**	**Plug**	11893–863

Style "PT-55" Time Element Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	54	**Machine Screw,** No. 10-30x$\frac{7}{16}$" Flat Hd. S. (C.N. 52143) (Tin Pl.) For attaching Operating Magnet and Clutch Relay to Mounting Bracket (Not Shown).	
	55	**Index Pin,** Ref. 55a with Nut Ref. 55b and No. 10 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47710) (N.P.).	
231639	55a	**Index Pin Only**	8097–949
	55b	**Nut,** No. 10-30 Hex. S. (C.N. 48070) (Tin Pl.).	
227895	56	**Spacer**	8072–889
227878	57	**Mounting Bracket Complete** (Inc. Bushing Ref. 122)	C–16818–3
	58	**Screw,** No. 4x$\frac{1}{4}$" Rd. Hd. Hardened (C.N. 52665) (Tin Pl.) For attaching Tag Holder to Mounting Bracket.	
102187	59	**Tag Holder**	11893–843
	60	**Stop Screw,** Ref. 60a with Nut Ref. 60b.	
232418	60a	**Stop Screw Only**	8098–1465
	60b	**Nut,** No. 8-36 Hex. S. (C.N. 48071) (Tin Pl.).	
266637	61	**Washer.** Used with Ref. 58	7828–138
227875	62	**Segment Complete** for 25 Seconds Time Range	C–16818–7
231645	62a	**Segment Complete** for 120 Seconds Time Range	C–16818–7
231646	62b	**Segment Complete** for 6 Minutes Time Range	C–16818–7
265424	62c	**Segment Complete** for 11 Minutes Time Range	C–16818–7
184	63	**Compression Washer**	7828–12
265435	64	**Nut**	8109–305
160339	65	**Shaft** for Ref. 2	12501–45
180814	65a	**Shaft** for Refs. 2a and 2b	12501–82

Style "PT-55" Time Element Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
265425	**65b**	**Shaft** for Ref. 2c	12501–82
162003	**66**	**Pinion** for Ref. 2	8424–262
160334	**66a**	**Pinion** for Refs. 2a and 2b	8424–255
265426	**66b**	**Pinion** for Ref. 2c	8424–311
160345	**67**	**Spur Gear** for Ref. 2	8424–256
180645	**67a**	**Spur Gear** for Refs. 2a, 2b and 2c	8424–271
265432	**68**	**Shaft**	12501–193
227876	**69**	**Washer**	8112–93
37417	**70**	**Pin**	10301–21
160343	**71**	**Worm**	8424–254
256638	**72**	**Bearing Bracket**	10914–1839
	73	**Machine Screw**, No. 4-48x$\frac{5}{16}$" Flat Hd. S. (C.N. 52152) (Tin Pl.).	
163001	**74**	**Coil Complete**, 175-ohms	8133–382
163000	**74a**	**Coil Complete**, 112-ohms	8133–382
152761	**74b**	**Coil Complete**, 72-ohms	8133–382
248638	**75**	**Back Strap Complete**	8162–228
234255	**76**	**Armature Complete**	8157–494
152756	**77**	**Armature Stop**	11893–432
	78	**Machine Screw**, No. 10-30x$\frac{1}{2}$" Fil. Hd. S. (C.N. 522005) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) Tin Pl.	
	79	**Machine Screw**, No. 6-40x$\frac{3}{16}$" Fil. Hd. S. (C.N. 52247) (Tin Pl.).	
215741	**80**	**Spring**	8124–259
108376	**81**	**Bracket Complete**	11893–911

Style "PT-55" Time Element Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

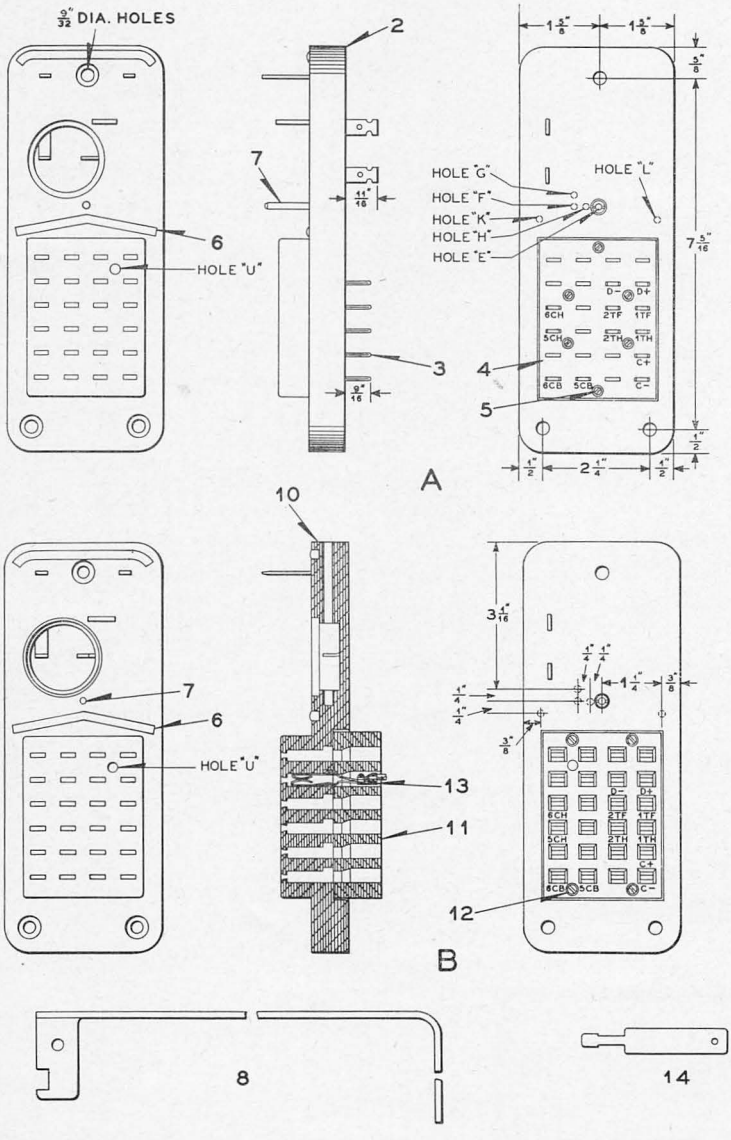
Piece	Ref.	Description	Drawing Reference
175630	**82**	**Spring Washer**	7828–374
169124	**83**	**Core Complete**	8101–346
227820	**84**	**Coil Complete,** 150-ohms	8133–579
232158	**84a**	**Coil Complete,** 100-ohms	8133–579
232159	**84b**	**Coil Complete,** 65-ohms	8133–579
158914	**85**	**Washer**	7828–363
	86	**Machine Screw,** No. 6-40x1/4" Flat Hd. S. (C.N. 52060) (Tin Pl.).	
227868	**87**	**Armature Complete**	8157–490
227869	**88**	**Contact Support**	8750–3059
254340	**89**	**Contact Stack Complete** (Space 1)	B–12660–50
254341	**90**	**Contact Stack Complete** (Space 2)	B–12660–50
156117	**91**	**Plate**	7828–285
	92	**Machine Screw,** No. 3-56x1 5/32" Fil. Hd. S. (C.N. 52477) (Tin Pl.) with No. 3 Lock Washer (Internal Teeth) (C.N. 47801) (Tin Pl.).	
152720	**93**	**Plate**	7828–275
239921	**94**	**Insulation**	8750–1460
239874	**95**	**Ins. Bushing**	B–10266–1
174235	**96**	**Insulation**	8750–2503
245096	**97**	**Contact Spring Complete**	8385–2790
152726	**98**	**Contact Spring Stop**	8385–2166
152725	**99**	**Contact Spring Complete**	8385–2166
152718	**100**	**Insulation**	8750–3044
173103	**101**	**Contact Spring Complete**	8385–2290

Style "PT-55" Time Element Relay

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	102	**Machine Screw,** No. 3-56x$\frac{13}{16}$" Fil. Hd. S. (C.N. 52376) (Tin Pl.) with No. 3 Lock Washer (Internal Teeth) (C.N. 47801) (Tin Pl.).	
152733	**103**	**Ins. Bushing**	B–10266–1
152728	**104**	**Contact Spring Complete**	8385–2167
227881	**105**	**Contact Block** with molded-in fingers but no contact springs	C–16649–14
227894	**106**	**Back Contact Spring Complete** (Silver Tip)	8385–2752
37417	**107**	**Rivet**	10301–21
232676	**108**	**Stop Spring**	8735–1000
234979	**109**	**Heel Control Contact Spring Complete** (Silver Tip and Magnet)	8385–2753
227882	**110**	**Contact Block** with molded-in fingers but no contact springs	C–16649–14
227892	**111**	**Heel Contact Spring Complete** (Silver Tips)	8385–2729
227731	**112**	**Front Contact Spring Complete** (Silver Imp. Carbon Tip)	8385–2731
231638	**113**	**Front Contact Spring Complete** (Silver Imp. Carbon Tip)	8385–2569
60845	**114**	**Pin**	8097–837
231634	**115**	**Stop Spring**	8735–1000
86606	**116**	**Flexible Connector**	10934–87
227883	**117**	**Contact Block** with molded-in fingers but no contact springs	C–16649–14
102198	**118**	**Back Contact Spring Complete** (Silver Imp. Carbon Tip)	8385–2569
227893	**119**	**Heel Contact Spring Complete** (Silver Tips)	8385–2730
233129	**120**	**Heel Contact Spring Complete** (Silver Tips)	8385–2744
233127	**121**	**Heel Contact Spring Complete** (Silver Tip)	8385–2745
227879	**122**	**Bushing** (Not shown) pressed into Mounting Bracket	8350–889



Mounting Bases for "PT-55" Relays

Style "PT-55" Time Element Relay

Detail Parts

Mounting Bases

See Plate E-5426 for complete Relays and details.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Mounting Base Complete with non-removable Receptacle Springs for Style "PT-55" Relay .... Drawing C-16655-7

Piece	Ref.	For use with "PT-55" Relay having the following characteristics		Location of Indexing Pin	Hole "U"
		Contacts	Timing Range		
227854	**A**	2 Time and 2 Check	2.5 to 25 seconds	E	With
227855	**Aa**	2 Time and 2 Check	10 to 120 seconds	F	With
227856	**Ab**	2 Time and 2 Check	0.5 to 6 minutes	G	With
233139	**Ac**	3 Time and 1 Check	2.5 to 25 seconds	H	With
265429	**Ad**	2 Time and 2 Check	1 to 11 minutes	K	With
269214	**Ae**	3 Time and 1 Check	10 to 120 seconds	L	With

Mounting Base Complete with removable Receptacle Springs for Style "PT-55" Relay .... Drawing C-16655-20

Piece	Ref.	For use with "PT-55" Relay having the following characteristics		Location of Indexing Pin	Hole "U"
		Contacts	Timing Range		
276068	**B**	2 Time and 2 Check	2.5 to 25 seconds	E	With
281106	**Ba**	2 Time and 2 Check	10 to 120 seconds	F	With
276792	**Bb**	2 Time and 2 Check	0.5 to 6 minutes	G	With
280394	**Bc**	3 Time and 1 Check	2.5 to 25 seconds	H	With
	Bd	2 Time and 2 Check	1 to 11 minutes	K	With
280395	**Be**	3 Time and 1 Check	10 to 120 seconds	L	With

Style "PT-55" Time Element Relay

Detail Parts

Mounting Bases

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
227849	**2**	**Mounting Base Only** (With holes U and E) for Ref. A	C–16649–7
227850	**2a**	**Mounting Base Only** (With holes U and F) for Ref. Aa	C–16649–7
227851	**2b**	**Mounting Base Only** (With holes U and G) for Ref. Ab	C–16649–7
233138	**2c**	**Mounting Base Only** (With holes U and H) for Ref. Ac	C–16649–7
265430	**2d**	**Mounting Base Only** (With holes U and K) for Ref. Ad	C–16649–7
269407	**2e**	**Mounting Base Only** (With holes U and L) for Ref. Ae	C–16649–7
102172	**3**	**Receptacle Spring** (non-removable type)	8385–2550
227862	**4**	**Clamping Plate** for Refs. A, Aa, Ab and Ad	8750–3062
268340	**4a**	**Clamping Plate** for Refs. Ac and Ae	8750–3496
	5	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. (C.N. 52236) (Tin Pl.) with No. 4 Plain S. Lock Washer (C.N. 47765) (Tin Pl.).	
102239	**6**	**Gasket**	8078–1654
	7	**Indexing Pin** Ref. 7a with Nut Ref. 7b and No. 6 S. Lock Washer (Internal Teeth) (C.N. 47713) (Tin Pl.).	
104617	**7a**	**Indexing Pin Only**	8097–767
104618	**7b**	**Nut**	8109–497
102238	**8**	**Test and Lock Lever**	A–2586–25
	9	**Machine Screw,** ¼"-20x1⅛" Rd. Hd. S. with ¼" Plain S. Lock Washer (C.N. 47775) and ¼"-20 Hex. S. Nut. For attaching Relay Mounting Base to Rack. (Not Shown).	
276066	**10**	**Mounting Base Only** (With holes U and E) for Ref. B	C–16649–21

Style "PT-55" Time Element Relay

Detail Parts

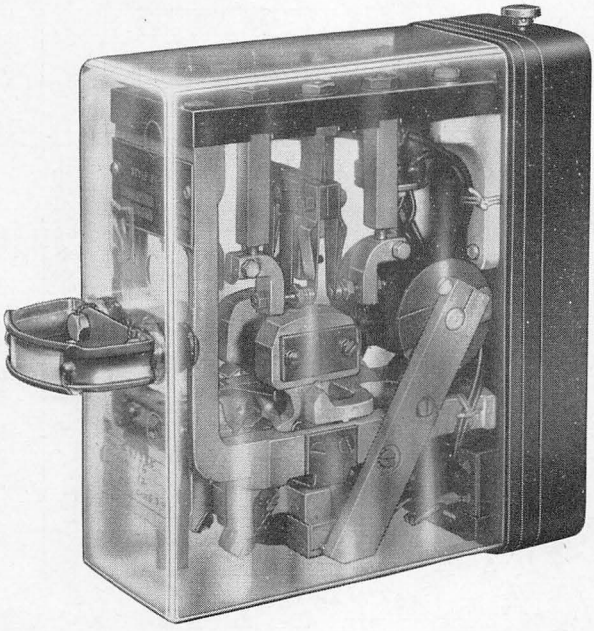
Mounting Bases

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
281104	**10a**	**Mounting Base Only** (With holes U and F) for Ref. Ba	C–16649–21
276790	**10b**	**Mounting Base Only** (With holes U and G) for Ref. Bb	C–16649–21
280390	**10c**	**Mounting Base Only** (With holes U and H) for Ref. Bc	C–16649–21
	10d	**Mounting Base Only** (With holes U and K) for Ref. Bd	C–16649–21
280391	**10e**	**Mounting Base Only** (With holes U and L) for Ref. Be	C–16649–21
259602	**11**	**Clamping Plate** for Refs. B, Ba, Bb and Bd	8750–3270
268341	**11a**	**Clamping Plate** for Refs. Bc and Be	8750–3497
	12	**Machine Screw,** No. 6-40x¾" Fil. Hd. S. (C.N. 52391) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.).	
272403	**13**	**Receptacle Spring Complete** (removable type)	8385–2871
268262	**14**	**Tool** for removing Receptacle Spring Ref. 13 from base	A–2586–86

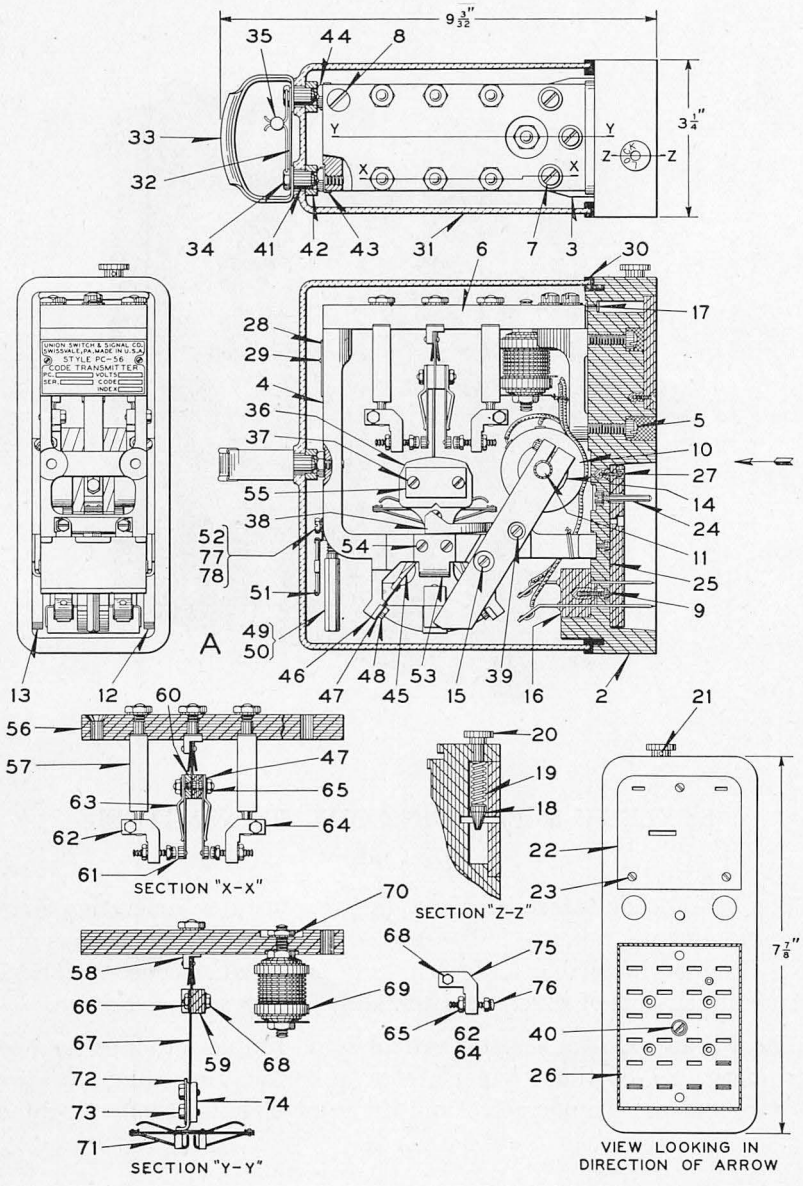
MEMORANDA



STYLE PC-56 PLUG-IN CODE TRANSMITTER
(75 Code)

The PC-56 code transmitter is of the plug-in type, generating a code of 75 impulses per minute. It is designed to withstand continuous operation. Contacts available for use in external circuits consist of 1F-1B dependent contacts of silver platinum alloy for low voltage service.

The PC-56 code transmitter provides the timing impulses for operation of the PT-55 time element relay in certain time ranges. Several PT-55 relays may be operated from the same code transmitter contact.



Style "PC-56" Code Transmitter
(75 Code)

Style "PC-56" Code Transmitter (75 Code)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
231703	**A**	**Style "PC-56" Code Transmitter Complete** (75 Code) with 1F-1B L.V. Sil. Plat. to Sil. Plat. Contacts and Drive Contact Sil. Plat. to Sil. Plat., 10 Volts D.C. and 75-Ohm Coil	C–16815–2
231764	**Aa**	**Style "PC-56" Code Transmitter Complete** (75 Code) with 1F-1B L.V. Sil. Plat. to Sil. Plat. Contacts and Drive Contact Sil. Plat. to Sil. Plat., 12 Volts and 14 Volts D.C. and 125-Ohm Coil	C–16815–2
232132	**Ab**	**Style "PC-56" Code Transmitter Complete** (75 Code) with 1F-1B L.V. Sil. Plat. to Sil. Plat. Contacts and Drive Contact Sil. Plat. to Sil. Plat., 16 Volts D.C. and 180-Ohm Coil	C–16815–2
231593	**2**	**Base**	C–16649–13
230039	**3**	**Terminal Board Bracket**	C–16816–1
229993	**4**	**Mounting Bracket**	C–16816–1
	5	**Machine Screw,** No. 14-24x1¼″ Fil. Hd. S. (C.N. 52330) (Tin Pl.).	
231702	**6**	**Terminal Board Complete**	C–16816–3
	7	**Machine Screw,** No. 14-24x⅞″ Fil. Hd. S. (C.N. 52326) (Tin Pl.) with ¼″ Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N.P.).	
	8	**Machine Screw,** No. 14-24x⅞″ Flat Hd. S. (C.N. 52108) (Tin Pl.).	
281945	**9**	**Machine Screw**	8098–1513
276102	**10**	**Coil Complete** (75-Ohms)	8133–570
232131	**10a**	**Coil Complete** (125-Ohms)	8133–570
276103	**10b**	**Coil Complete** (180-Ohms)	8133–570
227836	**11**	**Core**	8101–401
276090	**12**	**R.H. Pole Piece Complete**	8250–135
276092	**13**	**L.H. Pole Piece Complete**	8250–135

Style "PC-56" Code Transmitter (75 Code)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
175630	**14**	**Washer**	7828–374
	15	**Machine Screw,** No. 8-36x⅜" Flat Fil. Hd. S. (C.N. 52483) (Tin Pl.) with No. 8 Ph. Bz. Lock Washer (External Teeth) (C.N. 47902) (N.P.).	
231700	**16**	**Terminal Block**	C–16649–15
104614	**17**	**Plug**	11893–863
102135	**18**	**Latch Pin**	8097–760
102152	**19**	**Coil Spring**	8124–263
102148	**20**	**Collar**	8350–901
65245	**21**	**Rivet**	10301–21
102126	**22**	**Cover Plate**	8750–2820
	23	**Machine Screw,** No. 4-48x⅜" Flat Hd. S. (C.N. 52168) (Tin Pl.).	
	24	**Indexing Pin** Ref. 24a with Nut Ref. 24b and No. 6 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47708) (N.P.).	
108948	**24a**	**Indexing Pin Only**	8097–767
104618	**24b**	**Nut**	8109–497
231595	**25**	**Insulation**	8750–3064
231706	**26**	**Clamping Plate**	8750–3060
	27	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. (C.N. 52236) (Tin Pl.).	
231707	**28**	**Name Plate**	8225–611
	29	**Screw,** No. 4x¼" Rd. Hd. Hardened (C.N. 52665) (Tin Pl.).	
263534	**30**	**Gasket**	8078–1779
263533	**31**	**Cover**	C–16649–23

Style "PC-56" Code Transmitter
(75 Code)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
244341	**32**	**Locking Plate**	12538–281
104612	**33**	**Handle Complete**	8311–112
244330	**34**	**Screw**	8098–1472
	35	**Seal** Ref. 35a with 6″ Seal Wire.	
152702	**35a**	**Seal Only**	8988–33
232214	**36**	**Pendulum Assembly Complete**	C–16816–2
	37	**Machine Screw,** No. 6-40x½″ Fil. Hd. Br. (C.N. 51245) (N.P.) with No. 6 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47708) (N.P.).	
232070	**38**	**Shipping Bracket**	C–16816–5
	39	**Trunnion Screw** Ref. 39a with No. 8 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47709) (N.P.).	
232068	**39a**	**Trunion Screw Only**	8378–383
	40	**Shipping Screw** Ref. 40a with $\frac{1}{16}$″x$\frac{5}{16}$″ S. Cotter (C.N. 48664) (Tin Pl.) and Washer Ref. 40b.	
232069	**40a**	**Shipping Screw Only**	8094–1464
56349	**40b**	**Washer**	7826–180
270642	**41**	**Limiting Stud**	8098–1497
270643	**42**	**Compression Bushing**	8078–1792
253273	**43**	**Nut Lock**	7828–138
29103	**44**	**Nut**	8109–194
276078	**45**	**Bearing Arm Complete**	12748–86
254791	**46**	**Bolt Lock**	8486–367
	47	**Lock Washer,** No. 6 Ph. Bz. (Internal Teeth) (C.N. 47708) (N.P.).	
162755	**48**	**Screw**	8098–165

Style "PC-56" Code Transmitter
(75 Code)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

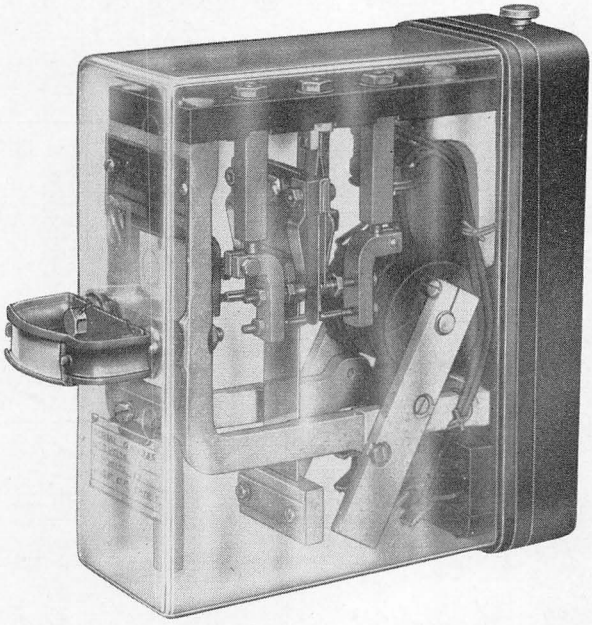
Piece	Ref.	Description	Drawing Reference
	49	**Stud** Ref. 49a with Nut Ref. 50.	
274465	49a	**Stud**	8114–1125
30420	50	**Nut**	8109–214
102187	51	**Tag Holder**	11893–843
213786	52	**Screw**	8098–701
276098	53	**Bearing End Plate**	10914–2172
	54	**Machine Screw,** No. 6-40x¼″ Flat Hd. Br. (C.N. 51016) (N.P.).	
276084	55	**Adjusting Weight** (.032″ thick)	9672–247
276085	55a	**Adjusting Weight** (.0159″ thick)	9672–247
276086	55b	**Adjusting Weight** (.008″ thick)	9672–247
283789	55c	**Adjusting Weight** (.0641″ thick)	9672–247
237777	56	**Terminal Board Only**	9968–1302
	57	**Terminal Post** with Nut and Washer (Inc. 1-57a, 1-44 and ¼″ Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N.P.)	12451–
227837	57a	**Terminal Post Only**	8094–2437
	58	**Terminal Post Complete** with Nut and Washer (Inc. 1-58a, 1-44 and one ¼″ Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N.P.).	
227839	58a	**Terminal Post Complete** (Inc. Springs) (Without Nut and Washer)	8094–2444
227825	59	**Contact Spring Support**	12770–38
228755	60	**Spacer**	12538–185
224184	61	**Contact Spring Complete** (Sil. Plat. Tip)	8385–2540
109103	62	**L.H. Contact Post Complete** (Inc. 1-75, 1-76 and 1-68)	8094–2413

Style "PC-56" Code Transmitter
(75 Code)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

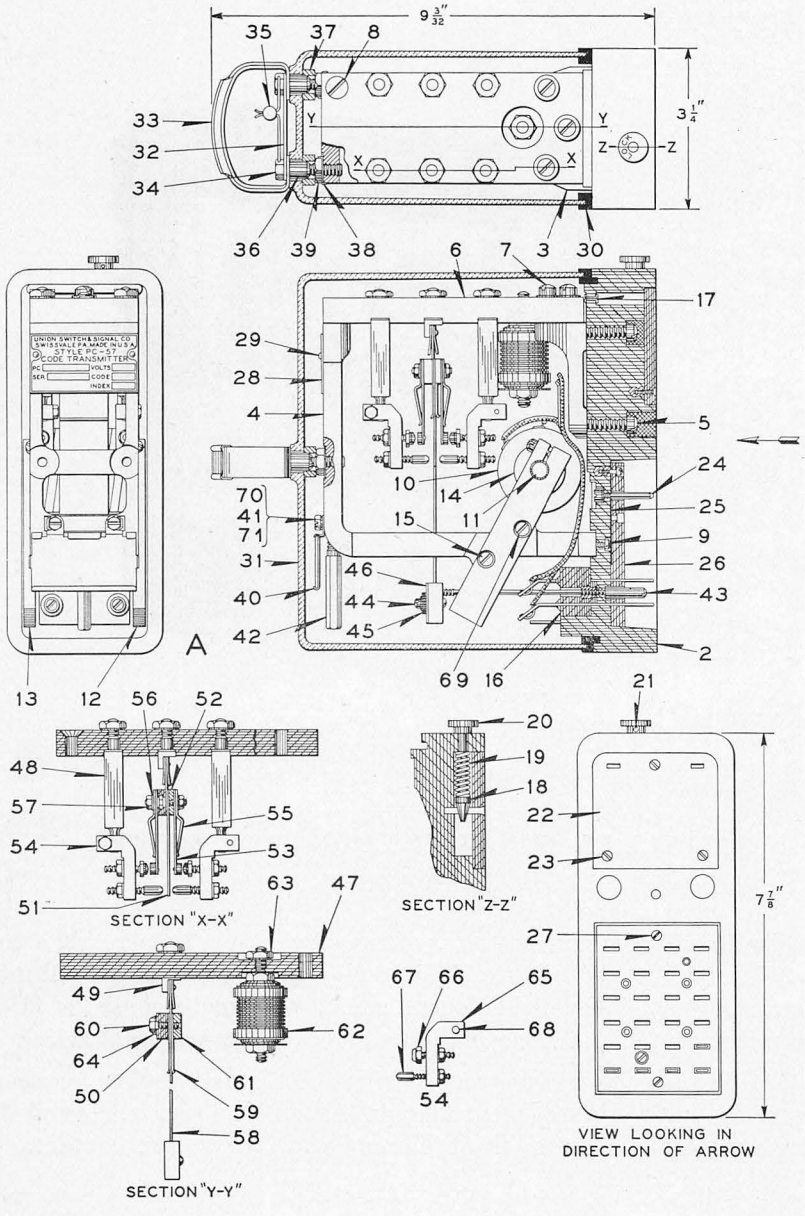
Piece	Ref.	Description	Drawing Reference
102525	**63**	**Contact Spring Stop**	8735–862
281368	**64**	**R.H. Contact Post Complete** (Inc. 1-75a, 1-76 and 1-68)	8094–2413
1505	**65**	**Nut**	8109–11
218836	**66**	**Nut**	8265–319
276099	**67**	**Operating Arm**	8735–1118
211046	**68**	**Screw**	8098–1437
	69	**Rectifier** Ref. 69a with Nut Ref. 70 and ¼" Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N.P.).	
231683	**69a**	**Rectifier Complete**	12746–15
	70	**Hex. Jam Nut,** ¼"-20 S. (C.N. 48003) (Tin Pl.).	
276083	**71**	**Drive Spring Assembly**	12748–87
276097	**72**	**Bolt Lock**	8486–432
162755	**73**	**Screw**	8098–165
276095	**74**	**Clamping Plate**	12538–325
102524	**75**	**Contact Support** for Ref. 62	C–9453–5
281399	**75a**	**Contact Support** for Ref. 64	C–9453–5
	76	**Contact Post** Ref. 76a with Nut Ref. 65 and No. 6 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47708) (N.P.).	
102511	**76a**	**Contact Post Complete** (Sil. Plat. Tip) Without Nut and Washer	8094–2369
102169	**77**	**Washer**	7828–401
208706	**78**	**Bolt Lock**	8486–399



STYLE PC-57 PLUG-IN CODE TRANSMITTER
(240 Code)

The PC-57 code transmitter is of the plug-in type, generating a code of 240 impulses per minute. It is designed to withstand continuous operation. Contacts available for use in external circuits consist of 1F-1B dependent contacts of silver platinum alloy for low voltage service.

The PC-57 code transmitter provides the timing impulses for operation of the PT-55 time element relay in certain time ranges. Several PT-55 relays may be operated from the same code transmitter contact.



Style "PC-57" Code Transmitter
(240 Code)

Style "PC-57" Code Transmitter (240 Code)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
231705	**A**	**Style "PC-57" Code Transmitter Complete** (240 Code) with 1F-1B L.V. Sil. Plat. to Sil. Plat. Contacts and Drive Contact Sil. Plat. to Sil. Plat., 10 Volts D.C. and 50-Ohm Coil	C–16815–4
231765	**Aa**	**Style "PC-57" Code Transmitter Complete** (240 Code) with 1F-1B L.V. Sil. Plat. to Sil. Plat. Contacts and Drive Contact Sil. Plat. to Sil. Plat., 12 Volts and 14 Volts D.C. and 70-Ohm Coil	C–16815–4
232133	**Ab**	**Style "PC-57" Code Transmitter Complete** (240 Code) with 1F-1B L.V. Sil. Plat. to Sil. Plat. Contacts and Drive Contact Sil. Plat. to Sil. Plat., 16 Volts D.C. and 125-Ohm Coil	C–16815–4
231594	**2**	**Base**	C–16649–13
230039	**3**	**Terminal Board Bracket**	C–16816–1
230038	**4**	**Mounting Bracket**	C–16816–6
	5	**Machine Screw,** No. 14-24x1¼″ Fil. Hd. S. (C.N. 52330) (Tin Pl.).	
231704	**6**	**Terminal Board Complete**	C–16816–4
	7	**Machine Screw,** No. 14-24x⅞″ Fil. Hd. S. (C.N. 52326) (Tin Pl.) with ¼″ Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N.P.).	
	8	**Machine Screw,** No. 14-24x⅞″ Flat Hd. S. (C.N. 52108) (Tin Pl.).	
281945	**9**	**Machine Screw**	8098–1513
231968	**10**	**Coil Complete** (50-Ohms)	8133–570
231969	**10a**	**Coil Complete** (70-Ohms)	8133–570
232131	**10b**	**Coil Complete** (125-Ohms)	8133–570
227836	**11**	**Core**	8101–401
227842	**12**	**R.H. Pole Piece Complete**	8250–130
227844	**13**	**L.H. Pole Piece Complete**	8250–130

Style "PC-57" Code Transmitter (240 Code)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
175630	**14**	**Washer**	7828–374
	15	**Machine Screw,** No. 8-36x⅜″ Flat Fil. Hd. S. (C.N. 52483) (Tin Pl.) with No. 8 Ph. Bz. Lock Washer (External Teeth) (C.N. 47902) (N.Pl.).	
231699	**16**	**Terminal Block**	C–16649–15
104614	**17**	**Plug**	11893–863
102135	**18**	**Latch Pin**	8097–760
102152	**19**	**Coil Spring**	8124–263
102148	**20**	**Collar**	8350–901
65245	**21**	**Rivet**	10301–21
102126	**22**	**Cover Plate**	8750–2820
	23	**Machine Screw,** No. 4-48x⅜″ Flat Hd. S. (C.N. 52168) (Tin Pl.).	
	24	**Indexing Pin** Ref. 24a with Nut Ref. 24b and No. 6 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47708) (N. Pl.).	
108948	**24a**	**Indexing Pin Only**	8097–767
104618	**24b**	**Nut**	8109–497
231595	**25**	**Insulation**	8750–3064
227860	**26**	**Clamping Plate**	8750–3060
	27	**Machine Screw,** No. 4-48x¼″ Fil. Hd. S. (C.N. 52236) (Tin Pl.).	
231708	**28**	**Name Plate**	8225–612
	29	**Screw,** No. 4x¼″ Rd. Hd. Hardened (C.N. 52665) (Tin Pl.).	
263534	**30**	**Gasket**	8078–1779
263533	**31**	**Cover**	C–16649–23

Style "PC-57" Code Transmitter (240 Code)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
244341	**32**	**Locking Plate**	12538–281
104612	**33**	**Handle Complete**	8311–112
244330	**34**	**Screw**	8098–1472
	35	Seal Ref. 35a with 6″ Seal Wire.	
152702	**35a**	**Seal Only**	8988–33
270642	**36**	**Limiting Stud**	8098–1497
270643	**37**	**Compression Bushing**	8078–1792
253273	**38**	**Nut Lock**	7828–138
29103	**39**	**Nut**	8109–194
102187	**40**	**Tag Holder**	11893–843
213786	**41**	**Screw Only**	8098–701
	42	Stud Ref. 42a with Nut Ref. 42b.	
274465	**42a**	**Stud Only**	8114–1125
30420	**42b**	**Nut**	8109–214
231701	**43**	**Shipping Screw**	8098–1460
	44	**Machine Screw,** No. 6-40x$\frac{3}{8}$″ Fil. Hd. Br. (C.N. 51244) (N.P.) with No. 6 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47708) (N. Pl.).	
199548	**45**	**Washer**	7828–176
227830	**46**	**Adjusting Weight** ($\frac{13}{16}$″ wide, .032″ thick)	9672–229
237820	**46a**	**Adjusting Weight** ($\frac{7}{16}$″ wide, .032″ thick)	9672–229
237777	**47**	**Terminal Board Only**	9968–1302
	48	**Terminal Post** with Nut and Washer (Inc. 1-48a, 1-39 and one $\frac{1}{4}$″ Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N. Pl.)	12451–

Style "PC-57" Code Transmitter
(240 Code)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

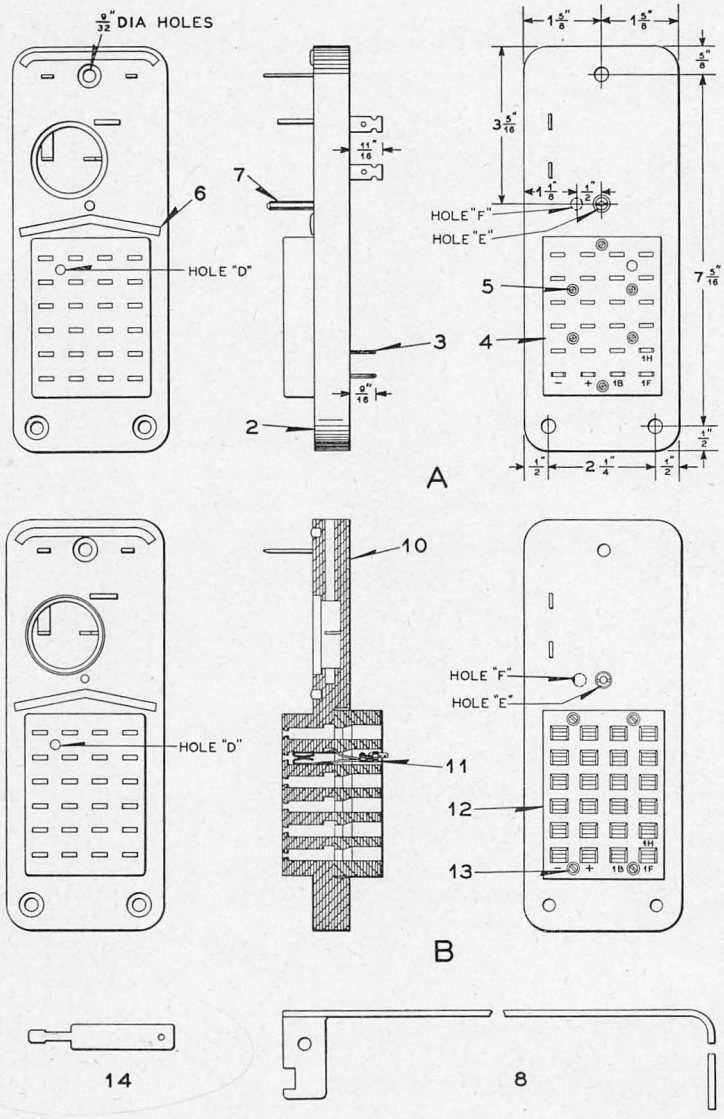
Piece	Ref.	Description	Drawing Reference
227837	48a	**Terminal Post Only**	8094–2437
	49	**Terminal Post Complete** with Nut and Washer (Inc. 1-49a, 1-39 and one ¼″ Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N. Pl.)	12451–
227839	49a	**Terminal Post Complete** (Inc. Springs) (Without Nut and Washer)	8094–2444
227827	50	**Contact Spring Support**	12770–38
221050	51	**Stop Spring**	8735–970
221049	52	**Spacer**	12538–241
224184	53	**Contact Spring Complete** (Sil. Plat. Tip)	8385–2540
220939	54	**Contact Post Complete** (Inc. 1-65, 1-66, 1-67 and 1-68)	8094–2426
102525	55	**Contact Spring Stop**	8735–862
	56	**Lock Washer,** No. 6 Ph. Bz. (Internal Teeth) (C.N. 47708) (N.P.).	
1505	57	**Nut**	8109–11
227835	58	**Operating Arm Complete**	12748–36
227840	59	**Reinforcing Spring**	8735–997
221184	60	**Screw**	8098–1437
227832	61	**Nut**	12538–255
	62	**Rectifier** Ref. 62a with Nut Ref. 63 and one ¼″ Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47792) (N.P.).	
231683	62a	**Rectifier**	12746–15
	63	**Hex. Jam Nut,** ¼″-20 S. (C.N. 48003) (Tin Pl.).	
56212	64	**Nut Lock**	8486–155
220921	65	**Contact Support**	C–9377–17

Style "PC-57" Code Transmitter (240 Code)

(**Continued**)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	66	**Contact Post** Ref. 66a with Nut Ref. 57 and No. 6 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47708) (N.P.).	
102511	**66a**	**Contact Post Complete** (Sil. Plat. Tip) (Without Nut and Washer)	8094–2369
	67	**Stop Pin** Ref. 67a with Nut Ref. 57 and No. 6 Ph. Bz. Lock Washer (Internal Teeth) (C.N.47708) (N.P.).	
220951	**67a**	**Stop Pin Only**	8098–1450
211046	**68**	**Screw**	8098–1437
	69	**Machine Screw**, No. 8-36x3/8" Flat Fil. Hd. S. (C.N. 52483) (Tin Pl.) with No. 8 Ph. Bz. Lock Washer (Internal Teeth) (C.N. 47709) (N.P.).	
102169	**70**	**Washer**	7828–401
208706	**71**	**Bolt Lock**	8486–399



Mounting Bases for "PC-56" and "PC-57" Code Transmitters

Styles "PC-56" and "PC-57" Code Transmitters

Detail Parts

Mounting Bases

For Transmitters refer to Plate E-5445 for Style "PC-56" and to Plate E-5446 for Style "PC-57"

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
227852	**A**	**Mounting Base Complete** with non-removable Receptacle Springs for Style "PC-56" Code Transmitter (With Indexing Hole "D" and Indexing Pin located in Hole "E")	C–16655–6
227853	**Aa**	**Mounting Base Complete** with non-removable Receptacle Springs for Style "PC-57" Code Transmitter (With Indexing Hole "D" and Indexing Pin located in Hole "F")	C–16655–6
276335	**B**	**Mounting Base Complete** with removable Receptacle Springs for Style "PC-56" Code Transmitter (With Indexing Hole "D" and Indexing Pin located in Hole "E")	C–16655–21
276071	**Ba**	**Mounting Base Complete** with removable Receptacle Springs for Style "PC-57" Code Transmitter (With Indexing Hole "D" and Indexing Pin located in Hole "F")	C–16655–21
227847	**2**	**Mounting Base Only** (With holes "D" and "E") for Ref. A	C–16649–7
227848	**2a**	**Mounting Base Only** (With holes "D" and "F") for Ref. Aa	C–16649–7
102172	**3**	**Receptacle Spring** (non-removable type)	8385–2550
227861	**4**	**Clamping Plate** for Refs. A and Aa	8750–3061
	5	**Machine Screw,** No. 4-48x¼" Fil. Hd. S. (C.N. 52236) (Tin Pl.) with No. 4 Plain S. Lock Washer (C.N. 47765) (Tin Pl.).	
102239	**6**	**Gasket**	8078–1654
	7	**Indexing Pin** Ref. 7a with Nut Ref. 7b and No. 6 S. Lock Washer (Internal Teeth) (C.N. 47713) (Tin Pl.).	
104617	**7a**	**Indexing Pin Only**	8097–767
104618	**7b**	**Nut**	8109–497
102238	**8**	**Test and Lock Lever**	A–2586–25

Styles "PC-56" and "PC-57" Code Transmitters

Detail Parts

Mounting Bases

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	9	**Machine Screw,** 1/4"-20x1 1/8" Rd. Hd. S. with 1/4" Plain S. Lock Washer (C.N. 47775) and 1/4"-20 Hex. S. Nut. For attaching Relay Mounting Base to Rack (Not Shown).	
276330	10	**Mounting Base Only** (With holes "D" and "E") for Ref. B	C–16649–21
276069	10a	**Mounting Base Only** (With holes "D" and "F") for Ref. Ba	C–16649–21
272403	11	**Receptacle Spring Complete** (removable type)	8385–2871
259603	12	**Clamping Plate** for Refs. B and Ba	8750–3271
	13	**Machine Screw,** No. 6-40x3/4" Fil. Hd. S. (C.N. 52391) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.).	
268282	14	**Tool** for removing Receptacle Spring Ref. 11 from base	A–2586–86

General Information and Ordering Instructions

Style "ML-10" Forced Drop Electric Locks

The Style "ML-10" Forced Drop Electric Lock is applicable to Mechanical and Electro-Mechanical Interlocking Machines with Latch Locking and is designed to meet present A.A.R. recommendations. The locking unit is simple and positive in action.

LOCKING COMBINATIONS:

Because of the revised safety requirements established during the year 1939, Style ML-10 Locks furnished subsequent to December 1, 1939 vary somewhat in design and characteristics from those furnished **prior** to December 1, 1939. The characteristics of these locks are outlined briefly as follows:

LOCKS FURNISHED PRIOR TO DECEMBER 1, 1939

Lock Bars were furnished for these locks which lock lever latch in the following positions:

(a) Normal; reverse; normal and reverse. These bars allow $\frac{3}{16}''$ lift of lever latch and require maintaining tight mechanical locking for effective force-drop action.

(b) Latch-up normal; latch-up reverse; latch-up normal and latch-up reverse; these bars hold machine lever latch to $\frac{3}{16}''$ drop below top of quadrant.

(c) Normal and latch-up normal; reverse and latch-up reverse; or all four. These bars allow $\frac{3}{16}''$ lift of machine lever latch and $\frac{3}{16}''$ drop of latch below top of quadrant, and require maintaining tight mechanical locking for effective force-drop action.

Locking dog has $\frac{7}{32}''$ lift, $\frac{1}{32}''$ clearance over notch when magnet is energized; $\frac{1}{32}''$ clearance above bottom of notch when magnet is de-energized, and $\frac{3}{16}''$ locking engagement.

LOCKS FURNISHED SUBSEQUENT TO DECEMBER 1, 1939

Lock Bars are available for these locks which lock the lever latch in the following positions:

(a) Normal; reverse; normal and reverse. These bars allow $\frac{7}{16}''$ lift of lever latch and permit maintaining mechanical locking so that lever latch can lift a maximum of $\frac{5}{16}''$.

(b) Latch-up normal; latch-up reverse; latch-up normal and latch-up reverse; these bars hold machine lever latch to $\frac{3}{16}''$ drop below top of quadrant.

(c) Normal and latch-up normal; reverse and latch-up reverse; or all four. These bars allow $\frac{3}{16}''$ lift of machine lever latch and $\frac{3}{16}''$ drop of latch below top of quadrant. Bars of this

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type allowing $\frac{7}{16}''$ lift of lever latch cannot be made, so tightness of mechanical locking must be maintained the same as for lock bars specified under (c) in locks furnished prior to December 1, 1939.

Locking dog has $\frac{5}{16}''$ lift, $\frac{1}{32}''$ clearance over notch when magnet is energized; $\frac{1}{32}''$ clearance above bottom of notch when magnet is deenergized, and $\frac{9}{32}''$ locking engagement.

MODERNIZATION OF LOCKS MANUFACTURED PRIOR TO DECEMBER 1, 1939

It is possible to replace locking bars of the early design with the later design locking bars in order to change the locking point of lever latch from $\frac{3}{16}''$ to $\frac{7}{16}''$ without changes in other details. The lift of the locking dog remains $\frac{7}{32}''$, however, and lock dog engagement remains $\frac{3}{16}''$. It will be necessary, however, to readjust make and break point of contact springs.

For complete modernization, new magnet coils of proper resistance (See Ordering Instructions), new locking dogs, and bearing and lock bar guide with proper depth of slot for locking dog must also be provided.

CIRCUIT CONTROLLER EQUIPMENT

As is usual with such equipment, a rather flexible combination of circuit controller units has been made available. The ordinary unit is provided with a roller operated directly from the lock bar by means of a crank. This roller carries a series of six (6) or twelve (12) independently adjustable cams that operate a similar number of relay type horizontally moving contacts, thus providing for six or twelve circuits in the standard lock. The driving mechanism for the cam roller is such that this roller is caused to operate rapidly at both extremities of its stroke and more slowly through the intermediate portion. This results in a very rapid operation of the contacts without introducing complicated quick break devices. It also permits a very delicate adjustment as to limits so that it has been found readily possible to shift a contact from full closed to full open position with as small a travel as $\frac{3}{16}''$ on the lever latch rod. The contacts of the circuit controller move horizontally and being of the relay type provide self cleaning surfaces. Their points are readily accessible and therefore their performance can be checked with the utmost ease.

Unless otherwise specified all 6-way controllers will be furnished with three normal, two reverse and one "BD" Contacts and the 12-way controller with six normal, five reverse and one "BD" Contacts.

ADDITIONAL CIRCUIT CONTROLLER EQUIPMENT FOR THE STYLE "ML-10" LOCK FOR ALL MOUNTINGS BELOW FLOOR

It frequently occurs that more than six (6) or twelve (12) circuits are to be broken through a lever lock of this type. When such is the case auxiliary circuit controllers may be obtained. These auxiliary circuit controllers are mounted beneath and in line with the 6-way or 12-way circuit controller in the lock proper and by

using 12-way lock and 12-way auxiliary controller a total of 24 contacts can be secured. Auxiliary Controllers for these Locks are available in six and twelve way units. They follow exactly the structure of the main circuit controller and are driven from the same crank, and therefore, offer all the advantages of the standard controller. See Catalog Plate E-5635.

ORDERING INSTRUCTIONS

Orders should be accompanied with the following information:

1. Type and location of machine to which Lock is to be applied.
2. Is lock to be mounted above or below Rocker Link.
3. Number of Contacts and Points at which Contacts are to open or close. (See symbols A.A.R. Plate 1676A—"Levers with end position as normal")
4. With or without Emergency Release.
5. With or without Armature Contacts.
6. Type of Lock Bar (Refer to Plate E-5640).
7. Voltage on which Lock is to operate: Unless otherwise specified locks will be furnished wound to 50-ohms for operation on 10-volts.
8. Lever numbers of the mechanical or electro-mechanical machine to which locks are to be applied.
9. Lever numbers of the mechanical machine on which other type locks are in service.
10. Lever numbers of the electro-mechanical machine on which locks (Specify type) or/and electric units are in service.

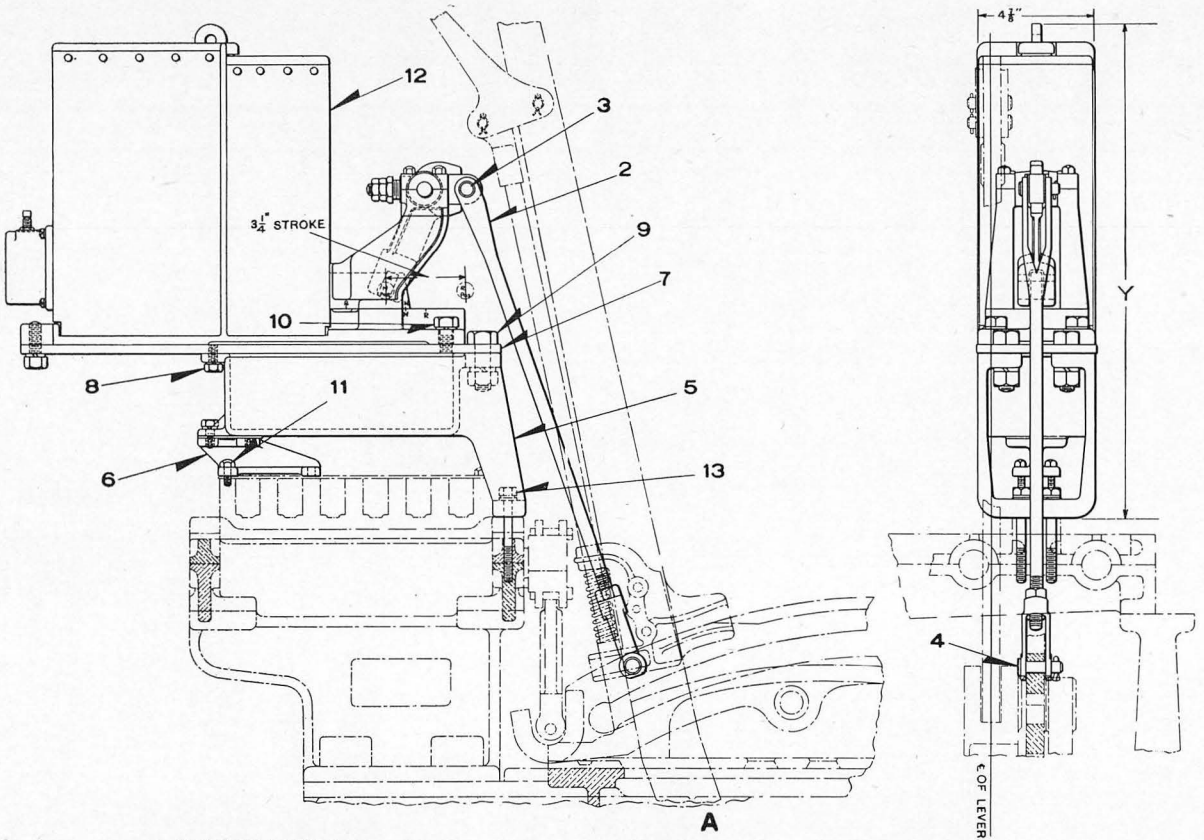
INFORMATION FOR REFERENCE ONLY:

1. For locks previous to December 1, 1939 ($\frac{7}{32}$" lift of locking dog)

Nominal Battery Volts	Min. Operating Volts at 70° F.	Resistance of Lock Ohms.
6	5.4	37.5
8	7.2	50.0
10	9.0	90.0
110	99.0	2000.0

2. For locks since December 1, 1939 ($\frac{5}{16}$" lift of locking dog)

Nominal Battery Volts	Min. Operating Volts at 70° F.	Resistance of Lock Ohms.
6	5.4	24
8	7.2	37.5
10	9.0	50.0
12	10.8	90.0
110	99.0	1750.0



APPLICATION OF STYLE "ML-10" FORCED DROP ELECTRIC LOCK
MOUNTED ABOVE ROCKER LINK OF S. & F. INT. MACHINE

UNION SWITCH & SIGNAL CO.

APPLICATION OF STYLE "ML-10" FORCED DROP ELECTRIC LOCK MOUNTED ABOVE ROCKER LINK OF S. & F. INTERLOCKING MACHINE

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Application of Style "ML-10" Forced Drop Electric Lock** mounted above Rocker Link of S. & F. Machine (Orders should specify Lock desired by referring to Plate E-5620 or Plate E-5625)	C–9213–1
150740	**2**	**Operating Rod, 19 3/8"** long, with Screw Jaw, Hex. Nut and Pins	B–7731–36
30304	**3**	**Pin, 1/2"x1 9/16"** Cheese Hd. with 1/8"x3/4" Cotter	B–10214–1
5377	**4**	**Pin, 1/2"x1 5/8"** Cheese Hd. with 1/8"x3/4" Cotter	B–10214–1
96658	**5**	**Bracket**	C–8124–3
96659	**6**	**Bracket**	C–8124–3
150741	**7**	**Supporting Plate, 1/2"x4 7/8"x20 1/8"**	9999–566
	8	**Tap Bolt, 3/8"-16x7/8"** Hex. Hd. S. with 3/8" Pl. S. Lock Washer (5/32"x3/32").	
	9	**Bolt 5/8"-11x2"** Hex. Hd. S with 5/8" Pl. S. Lock Washer (7/32"x1/8") and 5/8" Std. Hex. Nut.	
	10	**Tap Bolt, 1/2"-13x1 3/8"** Hex Hd. S. with 1/2" Pl. S. Lock Washer (3/16"x3/32").	
	11	**Cap Screw, 1/4"-20x7/8"** Hex. Hd. S.	
	12	**Style "ML-10" Forced Drop Eectric Lock** with Six Contacts (For details refer to Plate E-5620) ("Y" dimen. 20 7/8")	C–9220
	12a	**Style "ML-10" Forced Drop Electric Lock** with Twelve Contacts (For details refer to Plate E-5625) ("Y" dimension 27 1/2")	C–9220

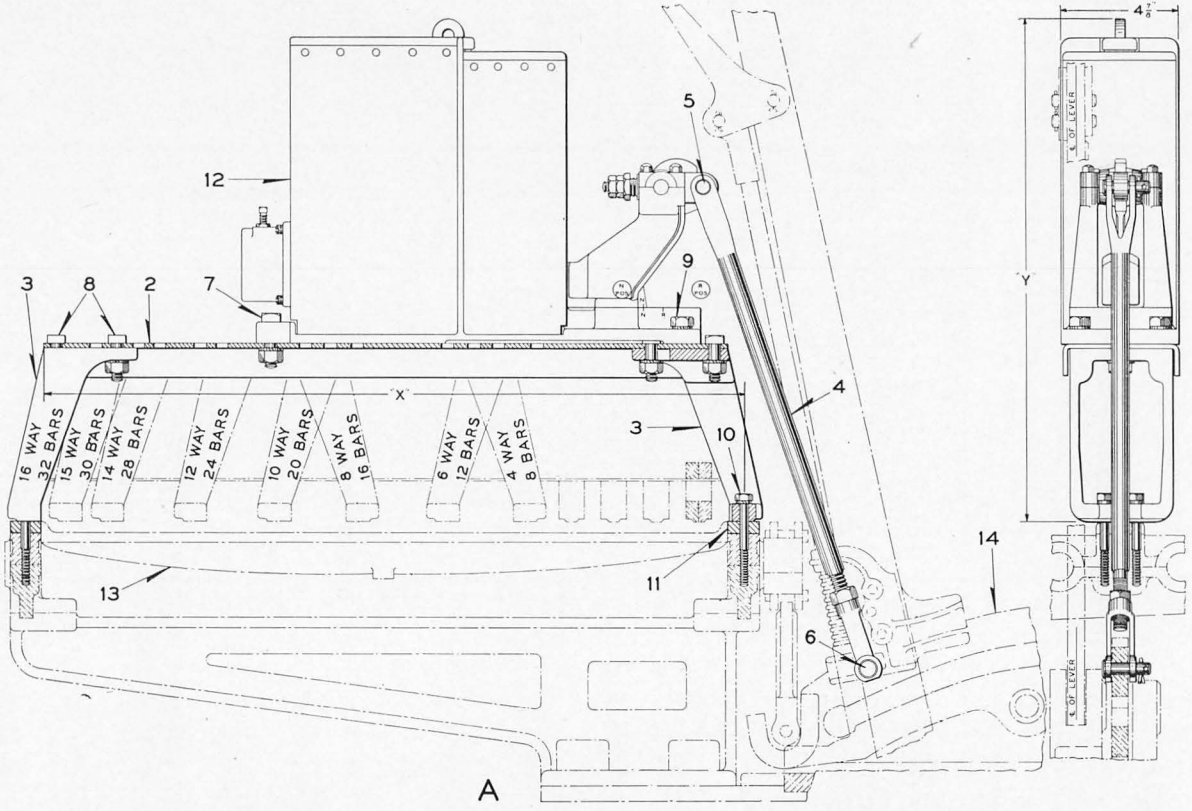
UNION SWITCH & SIGNAL CO.

APPLICATION OF STYLE "ML-10" FORCED DROP ELECTRIC LOCK MOUNTED ABOVE ROCKER LINK OF S. & F. INTERLOCKING MACHINE

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	13	**Cap Screw, 3/8"-16x3 7/8"** Hex. Hd. S. with 3/8" Std. S. Plate Washer and 3/8" Plain S. Lock Washer (Used when Lock is mounted on intermediate part of Machine.)	
	13a	**Cap Screw, 3/8"-16x5 5/8"** Hex. Hd. S. with 3/8" Std. S. Plate Washer and 3/8" Pl. S. Lock Washer (Used when Lock is mounted on joint of Machine.)	



Application of Style "ML-10" Lock Above Rocker Link of I. S. & F. Interlocking Machine

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of I. S. & F. Interlocking Machine

This design of lock support facilitates placing of orders, as it is adaptable to three practical divisions of locking bed sizes.

Ref. A Any locking bed up to 20 bars. "X" dim.—$20\frac{15}{16}$"
Ref. Aa. Any locking bed up to 32 bars. "X" dim.—$2'\ 5\frac{7}{16}$"
Ref. Ab. Locking bed size 36 or 40 bars. "X" dim.—$3'\ 0\frac{7}{16}$"

The back support leg, Ref. 3, may be bolted to holes in channel supports for Refs. A and Aa to suit any locking bracket within the defined length, and for Ref. Ab, holes are provided for both 36 and 40 bar width.

The space on the support back of the lock provides for support of wire conduit.

For restricted space limits, channel may be cut to length when installing, except that the length of the lock occupies a 20 bar width bed.

Ends of locking brackets in service must be machined level and in a plane with each other where lock supports rest. Locking brackets properly machined are listed for convenience if desirable to replace.

For details of original design of Application refer to Plate E-5600.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
231609	**A**	**Style "ML-10" Lock** with Universal Support and fittings for mounting on I. S. & F. Interlocking Machines with 8 to 20 Bars Inclusive (Orders should specify Lock desired by referring to Plate E-5620 or E-5625) Does not include Locking Bracket Ref. 13 nor Rocker Link Ref. 14.....	C–9213–19
230251	**Aa**	**Style "ML-10" Lock** with Universal Support and fittings for mounting on I. S. & F. Interlocking Machines with 8 to 32 Bars Inclusive (Orders should specify Lock desired by referring to Plate E-5620 or E-5625) Does not include Locking Bracket Ref. 13 nor Rocker Link Ref. 14.....	C–9213–19
234597	**Ab**	**Style "ML-10" Lock** with Universal Support and fittings for mounting on I. S. & F. Interlocking Machines with 36 or 40 Bars (Orders should specify Lock desired by referring to Plate E-5620 or E-5625) Does not include Locking Bracket Ref. 13 nor Rocker Link Ref. 14.....	C–9213–19
231608	**2**	**Universal Support** for applying "ML-10" Locks to I. S. & F. Machines with 8 to 20 Bars Inclusive....	C–16651–18
230250	**2a**	**Universal Support** for applying "ML-10" Locks to I. S. & F. Machines with 8 to 32 Bars Inclusive....	C–16651–18
234596	**2b**	**Universal Support** for applying "ML-10" Locks to I. S. & F. Machines with 36 or 40 Bars.....	C–16651–19
230283	**3**	**Leg**.....	C–16651–18
103868	**4**	**Operating Rod** with Screw Jaw and Hex. Nut.....	B–7727–41

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of I. S. & F. Interlocking Machine

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
209709	4a	**Screw Jaw** for Ref. 4	7742–86
3620	4b	**Hex. Nut** for Ref. 4	B–8265–2
	5	**Pin** Ref. 5a with $\frac{3}{16}$"x1" S. Cotter	8058–214
187345	5a	**Pin** (Arranged for seal locking)	8058–214
	6	**Pin** Ref. 6a with $\frac{3}{16}$"x1" S. Cotter	8058–214
187344	6a	**Pin** (Arranged for seal locking)	8058–214
	7	**Machine Bolt,** $\frac{1}{2}$"-13x1$\frac{3}{4}$" Sq. Hd. S. with $\frac{1}{2}$" Hex. Nut and $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$") For all applications except 8 Way (16 Bars) and 12 Way (24 Bars).	
	7a	**Machine Bolt,** $\frac{1}{2}$"-13x2$\frac{1}{4}$" Sq. Hd. S. with $\frac{1}{2}$" Hex. Nut and $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$") For 8 Way (16 Bars) and 12 Way (24 Bars) applications only.	
	8	**Machine Bolt,** $\frac{1}{2}$"-13x1$\frac{1}{2}$" Sq. Hd. S. with $\frac{1}{2}$" Hex. Nut and $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$").	
	9	**Tap Bolt,** $\frac{1}{2}$"-13x1$\frac{3}{4}$" Hex. Hd. S. with $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$").	
	10	**Cap Screw,** $\frac{3}{8}$"-16x3$\frac{5}{8}$" Hex. Hd. S. with $\frac{3}{8}$" Pl. S. Lock Washer ($\frac{11}{64}$"x$\frac{7}{64}$") Used when Lock is mounted on intermediate part of I. S. & F. Interlocking Machine.	
	10a	**Cap Screw,** $\frac{3}{8}$"-16x5$\frac{1}{2}$" Hex. Hd. S. with $\frac{3}{8}$" Pl. S. Lock Washer ($\frac{11}{64}$"x$\frac{7}{64}$") Used when Lock is mounted on joint of I. S. & F. Interlocking Machine.	
233461	11	**Filler.** Used when Locking Bracket is omitted	C–7284–1
	12	**Style "ML-10" Forced Drop Electric Lock** with Six Contacts (When ordering details or assemblies refer to Plate E-5620) ("Y" dimension 20$\frac{7}{8}$")	C–9220–

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of I. S. & F. Interlocking Machine

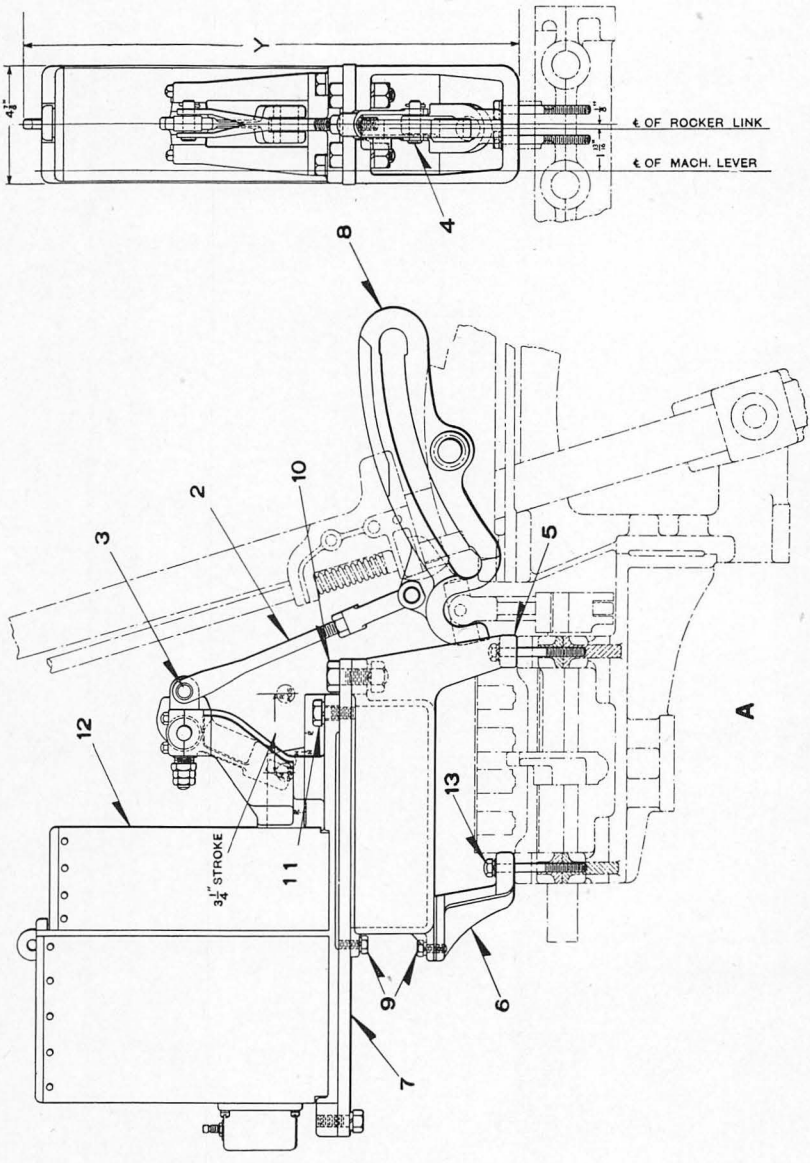
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	12a	**Style "ML-10" Forced Drop Electric Lock** with Twelve Contacts (When ordering details or assemblies refer to Plate E-5625) ("Y" dimension 27½")	C–9220–
234634	**13**	**Locking Bracket** with Machined Ends for 8-Bar Machine	B–4552–5
234635	**13a**	**Locking Bracket** with Machined Ends for 12-Bar Machine	B–4552–5
234636	**13b**	**Locking Bracket** with Machined Ends for 16-Bar Machine	B–4552–19
234637	**13c**	**Locking Bracket** with Machined Ends for 20-Bar Machine	B–4552–19
234638	**13d**	**Locking Bracket** with Machined Ends for 24-Bar Machine	B–4552–20
234639	**13e**	**Locking Bracket** with Machined Ends for 28-Bar Machine	B–4552–20
234640	**13f**	**Locking Bracket** with Machined Ends for 30-Bar Machine	B–4552–21
234641	**13g**	**Locking Bracket** with Machined Ends for 32-Bar Machine	B–4552–21
234642	**13h**	**Locking Bracket** with Machined Ends for 36-Bar Machine	B–4552–22
234643	**13j**	**Locking Bracket** with Machined Ends for 40-Bar Machine	B–4552–22
85155	**14**	**Rocker Link**	B–5241–1

PLATE E-5601

UNION SWITCH & SIGNAL CO.



APPLICATION OF STYLE "ML-10" FORCED DROP ELECTRIC LOCK MOUNTED ABOVE ROCKER LINK OF DWARF S. & F. INT. MACHINE

UNION SWITCH & SIGNAL CO.

APPLICATION OF STYLE "ML-10" FORCED DROP ELECTRIC LOCK MOUNTED ABOVE ROCKER LINK OF DWARF S. & F. INTERLOCKING MACHINE

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	A	**Application of Style "ML-10" Froced Drop Electrc Lock** mounted above Rocker Link of Dwarf S. & F. Interlocking Machine (Orders should specify Lock desired by referring to Plate E-5620 or Plate E-5625)	C–9213–4
152091	2	**Operating Rod, 8¾″** long, with Screw Jaw, Hex. Nut and Pins	B–7731–36
30304	3	**Pin, ½″x1 9/16″** Cheese Hd. with ⅛″x¾″ Cotter	B–10214–1
5377	4	**Pin, ½″x1⅝″** Cheese Hd. with ⅛″x¾″ Cotter	B–10214–1
96658	5	**Bracket**	C–8124–3
152089	6	**Bracket**	C–8124–4
150741	7	**Supporting Plate, ½″x4⅞″x20⅛″**	9999–566
152092	8	**Rocker Link**	B–5241–12
	9	**Tap Bolt, ⅜″-16x⅞″** Hex. Hd. S. with ⅜″ Pl. S. Lock Washer (5/32″x3/32″).	
	10	**Machine Bolt, ⅝″-11x2″** Hex. Hd. S. with ⅝″ Pl. S. Lock Washer (7/32″x⅛″) and ⅝″ Std. Hex. Nut.	
	11	**Tap Bolt, ½″-13x1⅜″** Hex. Hd. S. with ½″ Pl. S. Lock Washer (3/16″x3/32″).	
	12	**Style "ML-10" Forced Drop Electric Lock** with Six Contacts (For details refer to Plate E-5620) ("Y" dimen. 20⅞″)	C–9220
	12a	**Style "ML-10" Forced Drop Electric Lock** with twelve Contacts (For details refer to Plate E-5625) ("Y" dimension 27½″)	C–9220

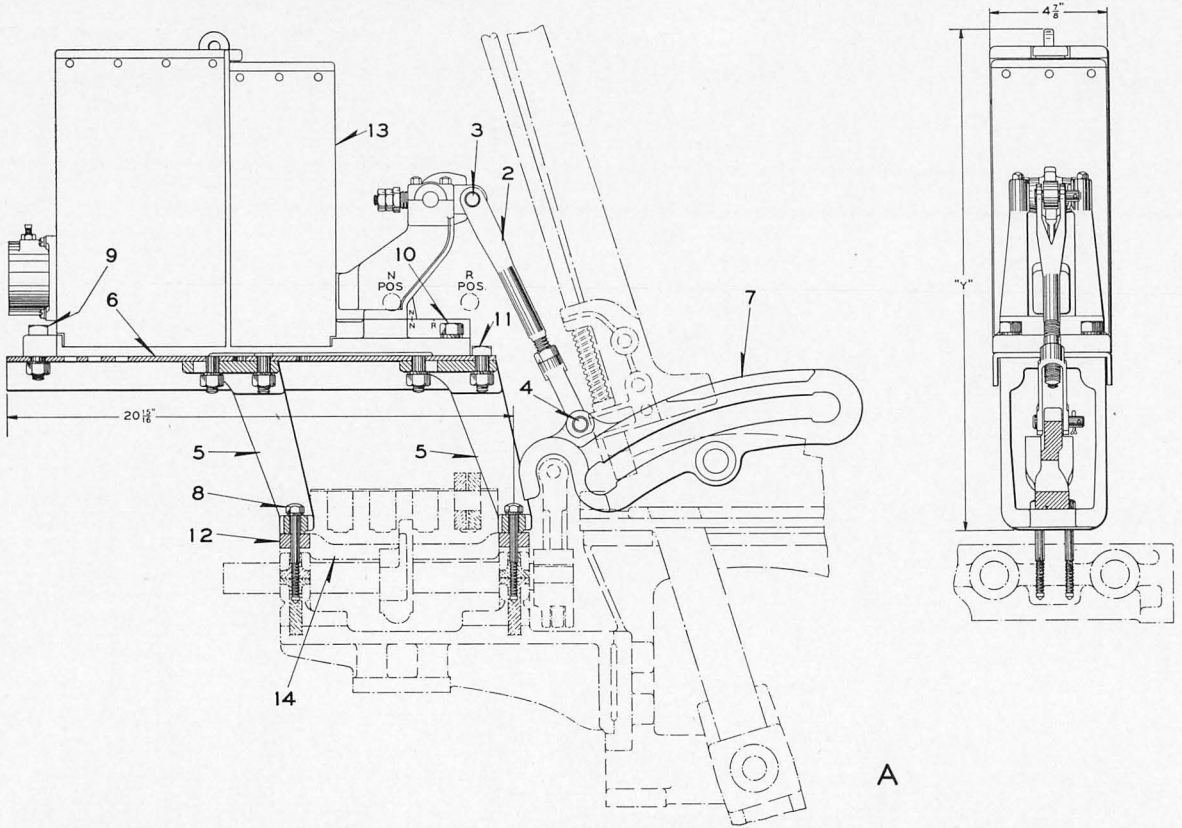
UNION SWITCH & SIGNAL CO.

APPLICATION OF STYLE "ML-10" FORCED DROP ELECTRIC LOCK MOUNTED ABOVE ROCKER LINK OF DWARF S. & F. INTERLOCKING MACHINE

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only.

Piece	Ref.	Description	Drawing Reference
	13	**Cap Screw, 3/8"-16x3 7/8"** Hex. Hd. with 3/8" Std. Plate Washer and 3/8" Pl. S. Lock Washer (Used when Lock is mounted on Intermediate part of Machine).	
	13a	**Cap Screw, 3/8"-16x5 5/8"** Hex. Hd. with 3/8" Std. Plate Washer and 3/8" Pl. S. Lock Washer (Used when Lock is mounted on Joint of Machine.)	



Application of Style "ML-10" Lock Above Rocker Link of Dwarf I. S. & F. Interlocking Machine

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of Dwarf I. S. & F. Interlocking Machine

Ends of locking brackets in service must be machined level and in a plane with each other where lock supports rest. Locking brackets properly machined are listed for convenience if desirable to replace.

For details of original design of Application refer to Plate E-5601.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

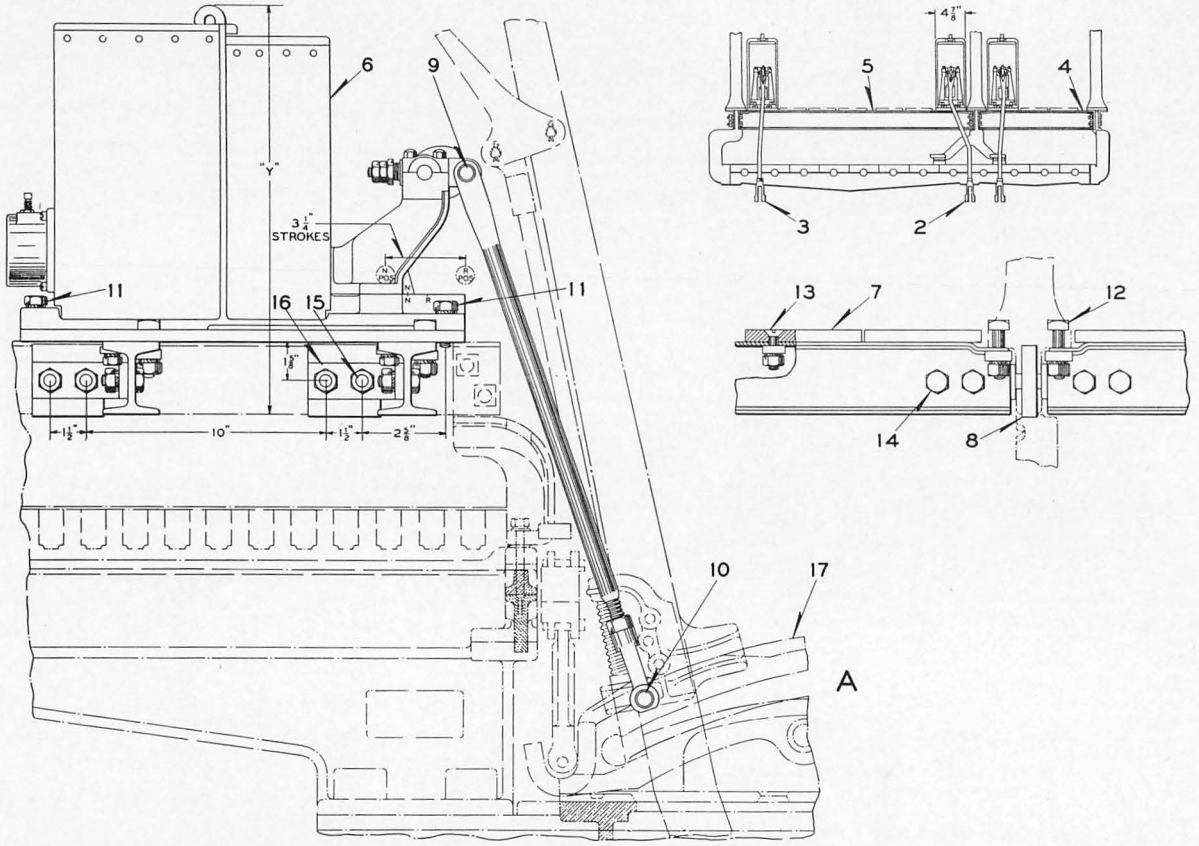
Piece	Ref.	Description	Drawing Reference
151443	**A**	**Style "ML-10" Lock** with Universal Support and fittings for mounting on I. S. & F. Dwarf Interlocking Machines with 8 to 20 Bars Inclusive (Orders should specify Lock desired by referring to Plate E-5620 or E-5625) Does not include Locking Bracket Ref. 14	C–9213–4
103870	**2**	**Operating Rod** with Screw Jaw and Hex. Nut	B–7727–41
209709	**2a**	**Screw Jaw** for Ref. 2	7742–86
3620	**2b**	**Hex. Nut** for Ref. 2	B–8265–2
	3	**Pin** Ref. 3a with $\frac{3}{16}$"x1" S. Cotter	8058–214
187345	**3a**	**Pin** (arranged for seal locking)	8058–214
	4	**Pin** Ref. 4a with $\frac{3}{16}$"x1" S. Cotter	8058–214
187344	**4a**	**Pin** (arranged for seal locking)	8058–214
230283	**5**	**Leg**	C–16651–18
231608	**6**	**Universal Support** for applying "ML-10" Locks to I. S. & F. Machines with 8 to 20 Bars inclusive	C–16651–18
152092	**7**	**Rocker Link**	B–5241–12
	8	**Cap Screw,** $\frac{3}{8}$"-16x5$\frac{1}{2}$" Hex. Hd. S. with $\frac{3}{8}$" Pl. S. Lock Washer ($\frac{11}{64}$"x$\frac{7}{64}$") Used when Lock is mounted on joint of I. S. & F. Interlocking Machine.	
	8a	**Cap Screw,** $\frac{3}{8}$"-16x3$\frac{5}{8}$" Hex. Hd. S. with $\frac{3}{8}$" Pl. S. Lock Washer ($\frac{11}{64}$"x$\frac{7}{64}$") Used when Lock is mounted on intermediate part of I. S. & F. Interlocking Machine.	
	9	**Bolt,** $\frac{1}{2}$"-13x1$\frac{3}{4}$" Sq. Hd. S. with $\frac{1}{2}$" Hex. Nut and $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$").	
	10	**Tap Bolt,** $\frac{1}{2}$"-13x1$\frac{3}{4}$" Hex. Hd. S. with $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$").	
	11	**Bolt,** $\frac{1}{2}$"-13x1$\frac{1}{2}$" Sq. Hd. S. with $\frac{1}{2}$" Hex. Nut and $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$").	

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of Dwarf I. S. & F. Interlocking Machine

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
233461	**12**	**Filler.** Used when Locking Bracket is omitted.....	C–7284–1
	13	**Style "ML-10" Forced Drop Electric Lock with Six Contacts** (When ordering details or assemblies refer to Plate E-5620) ("Y" dimension 20⅞").....	C–9220–
	13a	**Style "ML-10" Forced Drop Electric Lock with Twelve Contacts** (When ordering details or assemblies refer to Plate E-5625) ("Y" dimension 27½").....	C–9220–
234634	**14**	**Locking Bracket** with Machined Ends for 8-Bar Machines.....	B–4552–5
236815	**14a**	**Locking Bracket** with Machined Ends for 8-Bar Machines. For use when Locks are mounted on ends of Machines.....	B–4552–1



Application of Style "ML-10" Lock Above Rocker Link of Style "S-8" Electro-Mechanical Inter. Machine

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of Style "S-8" Electro-Mechanical Interlocking Machine

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

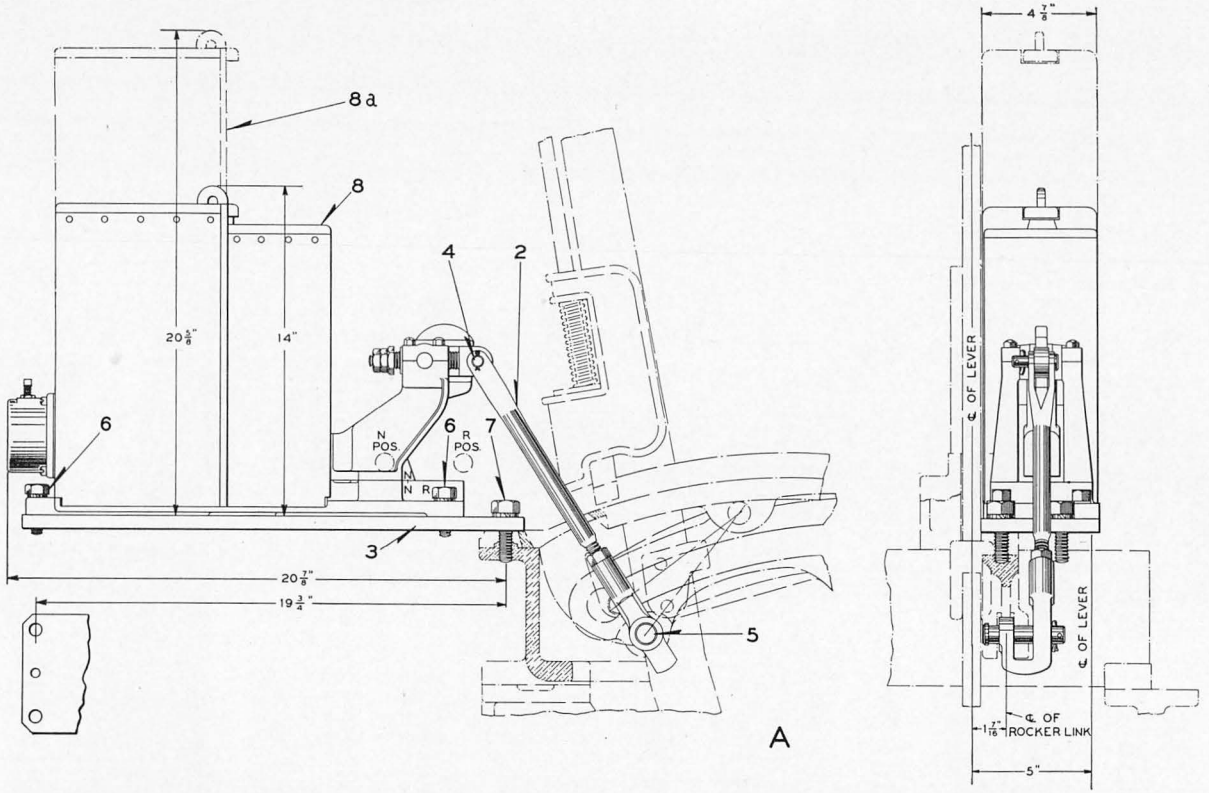
Piece	Ref.	Description	Drawing Reference
	A	**Style "ML-10" Lock** with Supports and fittings for mounting above Rocker Link of Style "S-8" Electro-Mechanical Interlocking Machine (Orders should specify Lock desired by referring to Plate E-5620 or E-5625, the size of the machine, which sections the "I" beams are to span and the numbers of the levers for which locks are required) Does not include Rocker Link Ref. 17	C–9213–5
104013	2	**Operating Rod** with Screw Jaw and Hex. Nut (Used on last lever of either 4 or 8 lever sections)	B–7727–42
104015	3	**Operating Rod** with Screw Jaw and Hex. Nut (Used on all Locks except those applied to last lever of either 4 or 8 lever section)	B–7727–42
209709	3a	**Screw Jaw** (5/8"-18 tap) for Refs. 2 and 3	7742–86
3620	3b	**Hex. Nut** (5/8"-18 tap) for Refs. 2 and 3	B–8265–2
153832	4	**I-Beam** for 4-lever section	C–8577–245
153833	5	**I-Beam** for 8-lever section	C–8577–245
	6	**Style "ML-10" Forced Drop Electric Lock with Six Contacts** (When ordering assemblies or details refer to Plate E-5620) ("Y" dimension 17")	C–9220–
	6a	**Style "ML-10" Forced Drop Electric Lock with Twelve Contacts** (When ordering assemblies or details refer to Plate E-5625) ("Y" dimension 23 5/8")	C–9220–
153834	7	**Supporting Plate**	C–8577–246
153836	8	**Filler**	9999–622
	9	**Pin** Ref. 9a with 3/16"x1" S. Cotter	8058–214
187345	9a	**Pin** (arranged for seal locking)	8058–214
	10	**Pin** Ref. 10a with 3/16"x1" S. Cotter	8058–214

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of Style "S-8" Electro-Mechanical Interlocking Machine

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
187344	10a	**Pin** (arranged for seal locking)	8058–214
	11	**Tap Bolt,** ½"-13x1½" Hex. Hd. S. with ½" Pl. S. Lock Washer (7/32"x5/32").	
	12	**Bolt,** ½"-13x2" Sq. Hd. S. with ½" Hex. Nut, ½" Pl. S. Lock Washer (7/32"x5/32") and Washer Ref. 12a.	
41885	12a	**Washer** for Ref. 12	8065–166
	13	**Machine Screw,** ⅜"-16x1¾" Flat Hd. S. with ⅜" Hex. Nut, ⅜" Pl. S. Lock Washer (11/64"x7/64") and Washer Ref. 13a.	
41387	13a	**Washer** for Ref. 13	8065–165
	14	**Bolt,** ½"-13x1¼" Hex. Hd. S. with ½" Hex. Nut and ½" Pl. S. Lock Washer (7/32"x5/32").	
	15	**Bolt,** ½"-13x2¾" Hex. Hd. S. with ½" Hex. Nut and ½" Pl. S. Lock Washer (7/32"x5/32") (Used when Lock is mounted at joint of machine).	
	15a	**Bolt,** ½"-13x2¼" Hex. Hd. S. with ½" Hex. Nut and ½" Pl. S. Lock Washer (7/32"x5/32") (Used when Lock is mounted at end of machine).	
153835	16	**Bracket** for mounting "I" beams on angle support	10914–150
85155	17	**Rocker Link**	B–5241–1

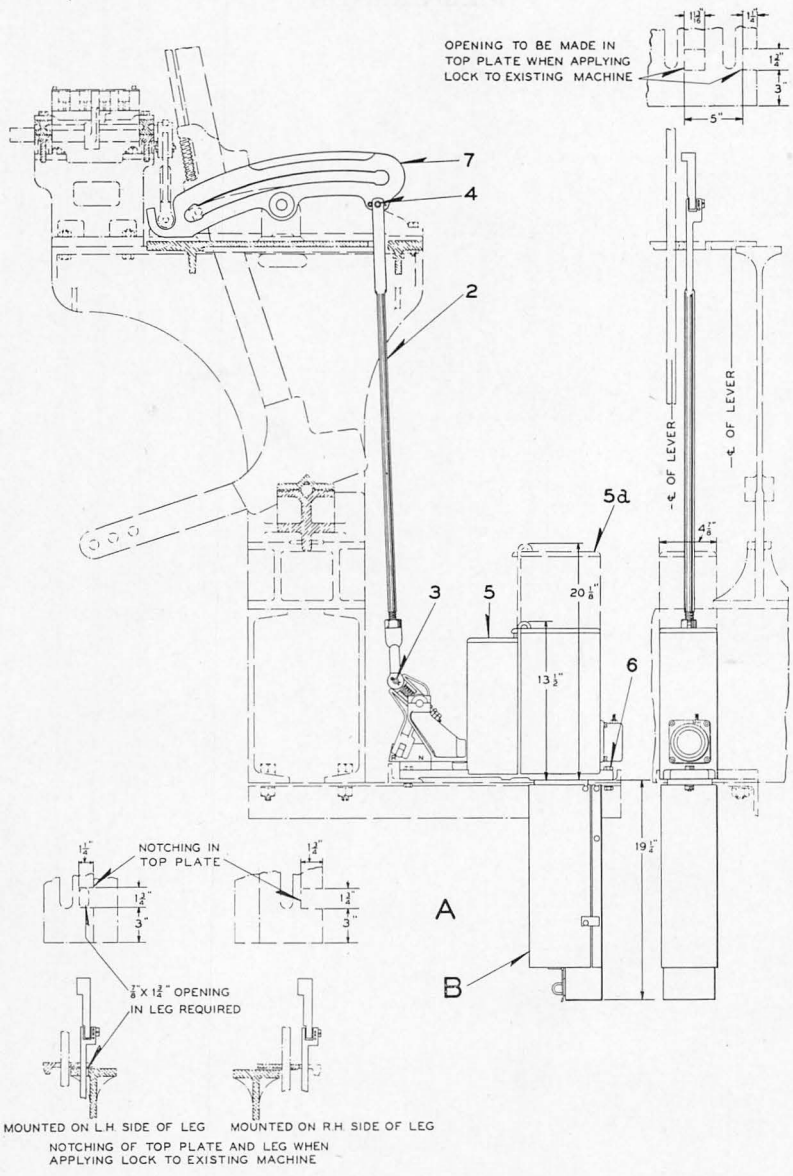


Application of Style "ML-10" Lock Above Floor of Style "A" Interlocking Machine

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Floor of Style "A" Interlocking Machine

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
150517	A	**Style "ML-10" Lock** with Supporting Plate and fittings for mounting above floor for Style "A" Interlocking Machine (Orders should specify Lock desired by referring to Plate E-5620 or E-5625)...	C–9213–2
103872	2	**Operating Rod** with Screw Jaw and Hex. Nut.....	B–7727–41
210542	2a	**Screw Jaw** ($\frac{5}{8}$"-18 tap).....	C–3904–2
3620	2b	**Hex. Nut** ($\frac{5}{8}$"-18 tap).....	B–8265–2
156426	3	**Supporting Plate**.....	9999–653
	4	**Pin** Ref. 4a with $\frac{3}{16}$"x1" S. Cotter.....	8058–214
187345	4a	**Pin** (arranged for seal locking).....	8058–214
	5	**Pin** Ref. 5a with $\frac{3}{16}$"x1$\frac{1}{8}$" S. Cotter.....	8076–85
103532	5a	**Pin** (arranged for seal locking).....	8076–85
	6	**Tap Bolt,** $\frac{1}{2}$"-13x1$\frac{1}{2}$" Hex. Hd. S. with $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$").	
	7	**Tap Bolt,** $\frac{5}{8}$"-11x2" Hex. Hd. S. with $\frac{5}{8}$" Pl. S. Lock Washer ($\frac{17}{64}$"x$\frac{3}{16}$").	
	8	**Style "ML-10" Forced Drop Electric Lock with Six Contacts** (When ordering assemblies or details refer to Plate E-5620).....	C–9220–
	8a	**Style "ML-10" Forced Drop Electric Lock with Twelve Contacts** (When ordering assemblies or details refer to Plate E-5625).....	C–9220–

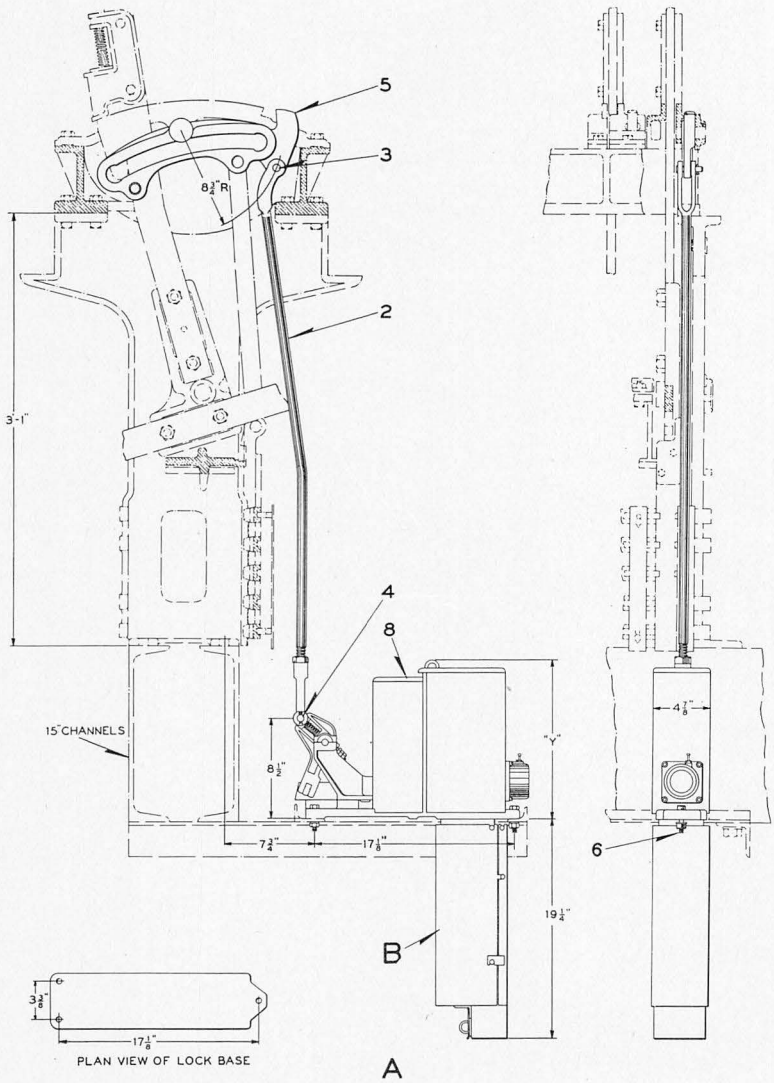


Application of Style "ML-10" Lock Below Rocker Link of I. S. & F. Interlocking Machine

Application of Style "ML-10" Forced Drop Electric Lock Mounted Below Rocker Link of I. S. & F. Interlocking Machine

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
150525	**A**	**Style "ML-10" Lock** with Fittings for mounting below Rocker Link of I. S. & F. Interlocking Machine. (Orders should specify Lock desired by referring to Plate E-5620 or E-5625 and if Auxiliary Circuit Controller is desired specify whether 6 or 12-Way)	C–9213–3
154535	**B**	**Auxiliary Circuit Controller** with Contacts in Upper Half only (6-Contacts) (For details see Plate E-5635)	C–9218–1
154534	**Ba**	**Auxiliary Circuit Controller** (12 Contacts) (For details see Plate E-5635)	C–9218–1
163537	**2**	**Operating Rod** with Screw Jaw and Hex. Nut	B–7727–36
163534	**2a**	**Screw Jaw** for Ref. 2 (¾"-20 tap)	7742–109
163535	**2b**	**Hex. Nut** for Ref. 2 (¾"-20 tap)	8265–232
	3	**Pin** Ref. 3a with $\frac{3}{16}$"x1" S. Cotter	8058–214
187345	**3a**	**Pin** (arranged for seal locking)	8058–214
	4	**Pin** Ref. 4a with ⅛"x1½" S. Cotter	8058–220
103421	**4a**	**Pin** (arranged for seal locking)	8058–220
	5	**Style "ML-10" Forced Drop Electric Lock with Six Contacts** (When ordering assemblies or details refer to Plate E-5620)	C–9220–
	5a	**Style "ML-10" Forced Drop Electric Lock with Twelve Contacts** (When ordering assemblies or details refer to Plate E-5625)	C–9220–
	6	**Bolt,** ½"-13x2" Hex. Hd. S. with ½" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$") and ½" Hex. Nut.	
124929	**7**	**Rocker Link**	B–5241–11
	8	**Tap Bolt,** ⅜"-16x1¼" Hex. Hd. S. with ⅜" Pl. S. Lock Washer ($\frac{11}{64}$"x$\frac{7}{64}$") for attaching Auxiliary Circuit Controller to Lock (Not shown).	

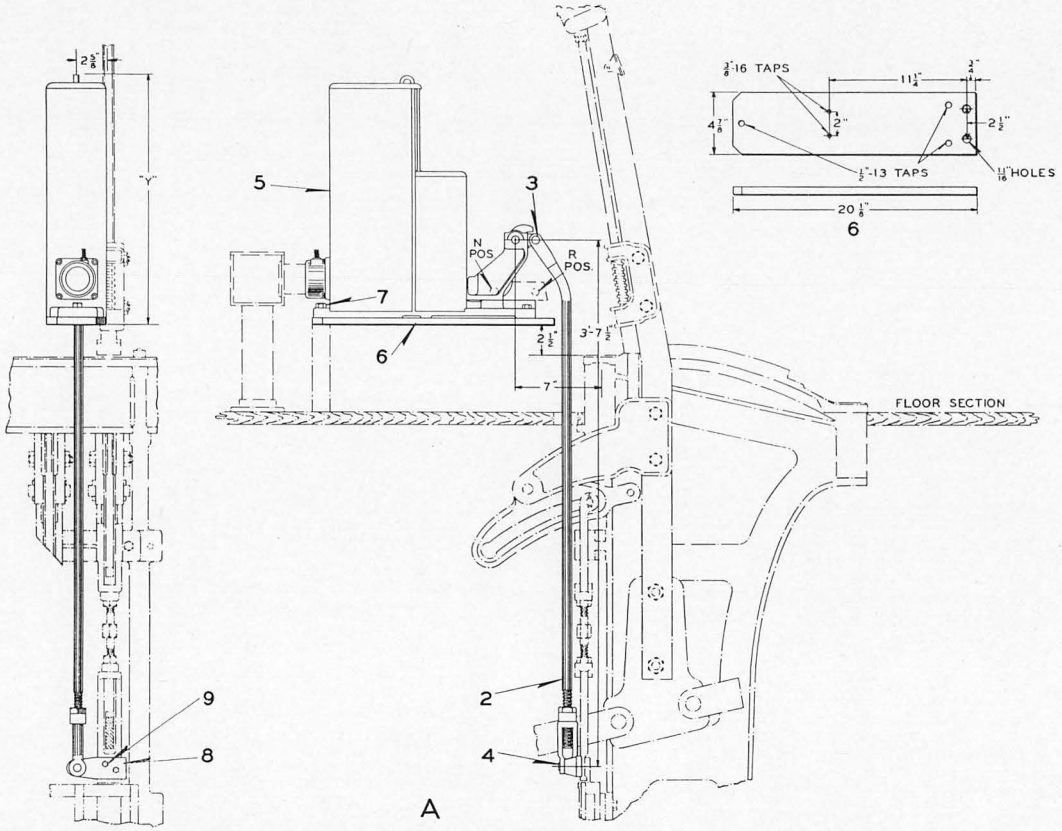


Application of Style "ML-10" Lock Below Floor of Style "A" Interlocking Machine

Application of Style "ML-10" Forced Drop Electric Lock Mounted Below Floor of Style "A" Interlocking Machine

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
159058	**A**	**Style "ML-10" Lock** with Fittings for mounting below Rocker Link of Style "A" Interlocking Machine (Orders should specify Lock desired by referring to Plate E-5620 or E-5625 and if Auxiliary Circuit Controller is desired specify whether 6 or 12-Way)	C–9213–6
154535	**B**	**Auxiliary Circuit Controller** with Contacts in Upper Half only (6 Contacts) (For details refer to Plate E-5635)	C–9218–1
154534	**Ba**	**Auxiliary Circuit Controller** (12 Contacts) (For details refer to Plate E-5635)	C–9218–1
159060	**2**	**Operating Rod** with Screw Jaw and Hex. Nut	B–7727–36
163534	**2a**	**Screw Jaw** for Ref. 2	7742–109
163535	**2b**	**Hex. Nut** for Ref. 2	8265–232
	3	**Pin** Ref. 3a with $\frac{3}{16}$″x1″ S. Cotter	8058–214
187344	**3a**	**Pin** (arranged for seal locking)	8058–214
	4	**Pin** Ref. 4a with $\frac{3}{16}$″x1″ S. Cotter	8058–214
187345	**4a**	**Pin** (arranged for seal locking)	8058–214
159059	**5**	**Rocker Link**	B–5241–12
	6	**Bolt,** $\frac{1}{2}$″-13x2″ Hex. Hd. S. with $\frac{1}{2}$″ Pl. S. Lock Washer ($\frac{7}{32}$″x$\frac{5}{32}$″) and $\frac{1}{2}$″ Hex. Nut.	
	8	**Style "ML-10" Forced Drop Electric Lock with Six Contacts** (When ordering assemblies or details refer to Plate E-5620) ("Y" dimension 13$\frac{1}{2}$″)	C–9220–
	8a	**Style "ML-10" Forced Drop Electric Lock with Twelve Contacts** (When ordering assemblies or details refer to Plate E-5625) ("Y" dimension 20$\frac{1}{8}$″)	C–9220–
	9	**Tap Bolt,** $\frac{3}{8}$″-16x1$\frac{1}{4}$″ Hex. Hd. S. with $\frac{3}{8}$″ Pl. S. Lock Washer ($\frac{11}{64}$″x$\frac{7}{64}$″) for attaching Auxiliary Circuit Controller to Lock (Not shown).	

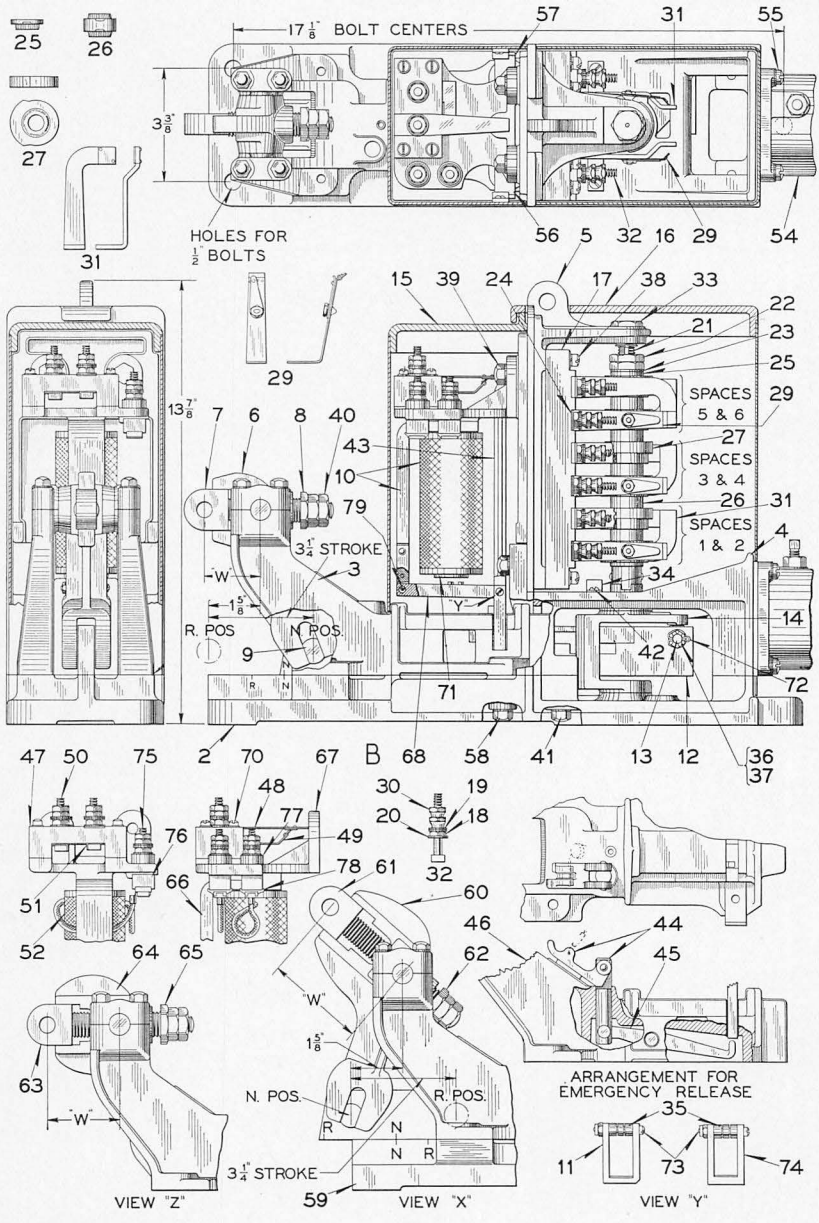


Application of Style "ML-10" Lock Above Rocker Link of Johnson Interlocking Machine

Application of Style "ML-10" Forced Drop Electric Lock Mounted Above Rocker Link of Johnson Interlocking Machine

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "ML-10" Lock** with Fittings for mounting above Rocker Link of Johnson Interlocking Machine (Orders should specify Lock desired by referring to Plate E-5620 or E-5625)	C–9213–14
217226	2	**Operating Rod** with Screw Jaw and Hex. Nut	B–7727–48
217364	2a	**Screw Jaw** for Ref. 2	7742–10
156299	2b	**Hex. Nut** for Ref. 2	8265–232
	3	**Pin** Ref. 3a with $\frac{3}{16}$"x1" S. Cotter	8058–214
217219	3a	**Pin** (arranged for seal locking)	8058–214
	4	**Pin** Ref. 4a with $\frac{3}{16}$"x1" S. Cotter	8058-214
187344	4a	**Pin** (arranged for seal locking)	8058–214
	5	**Style "ML-10" Forced Drop Electric Lock with Six Contacts** (When ordering assemblies or details refer to Plate E-5620) ("Y" dim. 14")	C–9220–
	5a	**Style "ML-10" Forced Drop Electric Lock with Twelve Contacts** (When ordering assemblies or details refer to Plate E-5625) ("Y" dim. 20$\frac{5}{8}$")	C–9220–
150741	6	**Supporting Plate**	9999–566
	7	**Tap Bolt,** $\frac{1}{2}$"-13x1$\frac{1}{2}$" Hex. Hd. S. with $\frac{1}{2}$" Pl. S. Lock Washer ($\frac{7}{32}$"x$\frac{5}{32}$").	
54156	8	**Bracket**	C–4403–1
	9	**Cap Screw,** $\frac{3}{8}$"-16x1$\frac{1}{4}$" Hex. Hd. S.	



Style "ML-10" 6-Way Forced Drop Electric Locks

Style "ML-10" 6-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

Unless otherwise specified all Locks will be furnished with coils wound to 50-ohms resistance for operation on 10-Volts D.C; 3-Normal, 2-Reverse and 1 "BD" Contacts on Circuit Controller; without Emergency Release and Armature Contact. (Orders should specify Lock Bar required by referring to Plate E-5640).

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "ML-10" 6-Way Forced Drop Electric Lock. (Lock Bar as specified referring to Plate E-5640).

Piece	Ref.	Machine	Circuit Controller Contacts	Above or Below Floor Mount.	Remarks	"W" Dim.	Drawing Reference
	B	I.S. & F.	3N-2R&1BD	Above	As shown	$1\frac{3}{4}''$	C–9220–1
	Ba	Dwarf I.S. & F.	3N-2R&1BD	Above	As shown	$1\frac{3}{4}''$	C–9220–1
	Bb	Style "A"	3N-2R&1BD	Above	Per View "Z"	$2\frac{5}{16}''$	C–9220–4
	***Bc**	I.S. & F.	Without	Above	As shown	$1\frac{3}{4}''$	C–9220–1
	***Bd**	Dwarf I.S. & F.	Without	Above	As shown	$1\frac{3}{4}''$	C–9220–1
	***Be**	Style "A"	Without	Above	Per View "Z"	$2\frac{5}{16}''$	C–9220–4
	Bf	I.S. & F.	3N-2R&1BD	Below	Per View "X"	$3''$	C–9220–2
	Bg	Style "A"	3N-2R&1BD	Below	Per View "X"	$3\frac{1}{8}''$	C–9220–2
	***Bh**	I.S. & F.	Without	Below	Per View "X"	$3''$	C–9220–2
	***Bj**	Style "A"	Without	Below	Per View "X"	$3\frac{1}{8}''$	C–9220–2
	Bk	Johnson	3N-2R&1BD	Above	As shown	$1\frac{21}{32}''$	C–9220–

*Refs. Bc, Bd, Be, Bh and Bj do not include Refs. 13, 14, 17, 21 to 27, 29, 31, 32, 33, 36, 37, 38 and 72.

Style "ML-10" 6-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
137156	**2**	**Base** for Locks mounted without auxiliary controller.	C–9214–1
141462	**3**	**Bearing and Lock Bar Guide** (With Slot for $\frac{7}{32}$" lift of Locking Dog)	C–9214–2
215505	**3a**	**Bearing and Lock Bar Guide** (With Slot for $\frac{5}{16}$" lift of Locking Dog)	C–9214–2
220361	**3b**	**Bearing and Lock Bar Guide** (Without Slot for Locking Dog) When Magnet Assembly is not required for Locks mounted below Rocker Link	C–9214–2
137159	**4**	**Circuit Controller Support**	C–9214–4
137308	**5**	**Circuit Controller Bearing**	C–9214–5
220359	**5a**	**Circuit Controller Bearing** (Without holes for mounting Magnet Assembly) When Magnet Assembly is not required for Locks mounted below Rocker Link	C–9214–5
137983	**6**	**Main Operating Crank** for Locks mounted above Rocker Link of I. S. & F. Machines	C–9214–3
150221	**7**	**Adjustable Arm** for Locks mounted above Rocker Link of I. S. & F. Machines	8034–190
150218	**8**	**Adjusting Sleeve** for Locks mounted above Rocker Link of I. S. & F. Machines	8072–688
150224	**9**	**Pin**	8076–79
154800	**10**	**Magnet Assembly** (90-Ohms) Without Armature Contact	B–12438–37
169519	**10a**	**Magnet Assembly** (90-Ohms) With Armature Contact Normally Closed	B–12438–37
150292	**10b**	**Magnet Assembly** (50-Ohms) Without Armature Contact	B–12438–37
141465	**10c**	**Magnet Assembly** (50-Ohms) With Armature Contact Normally Closed	B–12438–37
219989	**10d**	**Magnet Assembly** (37.5-Ohms) Without Armature Contact	B–12438–37

Style "ML-10" 6-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
219990	**10e**	**Magnet Assembly** (37.5-Ohms) With Armature Contact Normally Closed	B–12438–37
221849	**10f**	**Magnet Assembly** (24-Ohms) Without Armature Contact	B–12438–37
195463	**10g**	**Magnet Assembly** (1750-Ohms) Without Armature Contact	B–12438–37
	10h	**Magnet Assembly** (2000-Ohms) Without Armature Contact	B–12438–37
150216	**11**	**Locking Dog** (For $\frac{7}{32}$" lift, tapped for use of Screw Ref. 73, for Locks furnished previous to 12-1-39, see Ref. 74 for new Locking Dog)	9121–121
	12	**Lock Bar** (For details see Plate E-5640)	C–9219–
150215	**13**	**Driving Piece**	8114–365
150850	**14**	**Circuit Controller Operating Arm**	C–9214–3
150851	**14a**	**Circuit Controller Operating Arm** for operating Auxiliary Controller	C–9214–3
141470	**15**	**Magnet Cover**	C–9214–7
141471	**16**	**Circuit Controller Cover**	C–9214–8
150795	**17**	**Contact Spring Board** (2 required)	9968–858
29103	**18**	**Nut**	8109–194
29102	**19**	**Washer**	7828–139
29104	**20**	**Washer**	7828–138
150871	**21**	**Shaft**	12501–32
46641	**22**	**Nut**	8265–70
136193	**23**	**Washer**	7826–249
155129	**24**	**Spring**	8735–319
150612	**25**	**Cam Adjustment Collar**	8065–203

Style "ML-10" 6-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
150394	**26**	**Cam Adjustment Collar**	8065–202
150397	**27**	**Cam**	8750–2307
187815	**28**	**Pin** for attaching Locking Dog Ref. 11 (not tapped for screw) to armature (Not shown, used on Locks furnished previous to 10-26-32, see Ref. 73 for later arrangement)	8097–468
150609	**29**	**Contact Spring** with Cam Stud Ref. 29a, Locating Spring Ref. 29b and Nut Ref. 29c	8385–2150
150600	**29a**	**Cam Stud** for Ref. 29	8114–681
150604	**29b**	**Locating Spring** for Ref. 29	8735–658
20060	**29c**	**Nut** for Ref. 29	8265–85
29101	**30**	**Nut**	8109–193
150606	**31**	**Contact Piece**	8094–2208
	32	**Terminal Post** with Nuts and Washers (Inc. 1-32a, 1-18, 2-19, 1-20 and 2-30)	12451–
115706	**32a**	**Terminal Post only** for Refs. 32 and 75	8094–1192
112203	**33**	**Trunnion**	8378–348
150794	**34**	**Wire Clip**	11893–419
150393	**35**	**Separator** (Used when Armature Contact Operating Rod is not furnished)	8072–598
	36	**Slotted Hex. Nut,** $\frac{5}{16}$"-18 (Cad. Pl.).	
	37	**Lock Washer,** $\frac{5}{16}$" Pl. S. ($\frac{1}{8}$"x$\frac{1}{16}$") (Cad. Pl.).	
	38	**Machine Screw,** No. 14-24x1$\frac{1}{8}$" Fil. Hd. S. (Cad. Pl.) with $\frac{1}{4}$" Shakeproof Lock Washer (Internal Teeth).	
	39	**Cap Screw,** $\frac{3}{8}$"-16x1" Hex. Hd. S. (Cad. Pl.) with $\frac{3}{8}$" Shakeproof Lock Washer (Internal Teeth).	
	40	**Nut,** $\frac{1}{2}$"-13 Hex. Jam (Cad. Pl.).	

Style "ML-10" 6-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	41	**Cap Screw,** $\frac{3}{8}$"-16x1$\frac{1}{2}$" Hex. Hd. S. (Cad. Pl.) with $\frac{3}{8}$" Shakeproof Lock Washer (Internal Teeth).	
	42	**Machine Screw,** No. 10-30x$\frac{1}{4}$" Rd. Hd. S. (Cad. Pl.).	
141464	43	**Armature Contact Rod**	9595–86
154675	44	**Seal Wire Hasp** for Locks having Emergency Release	9925–26
154568	45	**Arm** (For $\frac{7}{32}$" lift on Locking Dog) for Locks having Emergency Release	8192–356
212090	45a	**Arm** (For $\frac{5}{16}$" lift on Locking Dog) for Locks having Emergency Release	8192–356
154601	46	**Bearing and Lock Bar Guide** (With Slot for $\frac{7}{32}$" lift on Locking Dog) for Locks having Emergency Release	C–9214–2
212078	46a	**Bearing and Lock Bar Guide** (With Slot for $\frac{5}{16}$" lift on Locking Dog) for Locks having Emergency Release	C–9214–2
150271	47	**Armature Contact Spring Board with Springs** (Inc. 1-47a, 1-48, 1-49, 2-50 and 2-51)	9968–853
150270	47a	**Armature Contact Terminal Board only,** for Ref. 47	9968–852
141467	48	**Long Contact Spring**	8385–2146
141468	49	**Short Contact Spring**	8385–2145
	50	**Terminal Post** with Nuts and Washers (Inc. 1-50a, 3-18, 2-19 and 1-20)	12451–
186848	50a	**Terminal Post only**	8094–2207
150219	51	**Bolt Lock**	8486–381
150150	52	**Coil** 50-Ohms for Refs. 10b and 10c	8133–129
154828	52a	**Coil** 90-Ohms for Refs. 10 and 10a	8133–129
212079	52b	**Coil** 37.5-Ohms for Refs. 10d and 10e	8133–129
221857	52c	**Coil** 24-Ohms for Ref. 10f	8133–129

Style "ML-10" 6-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

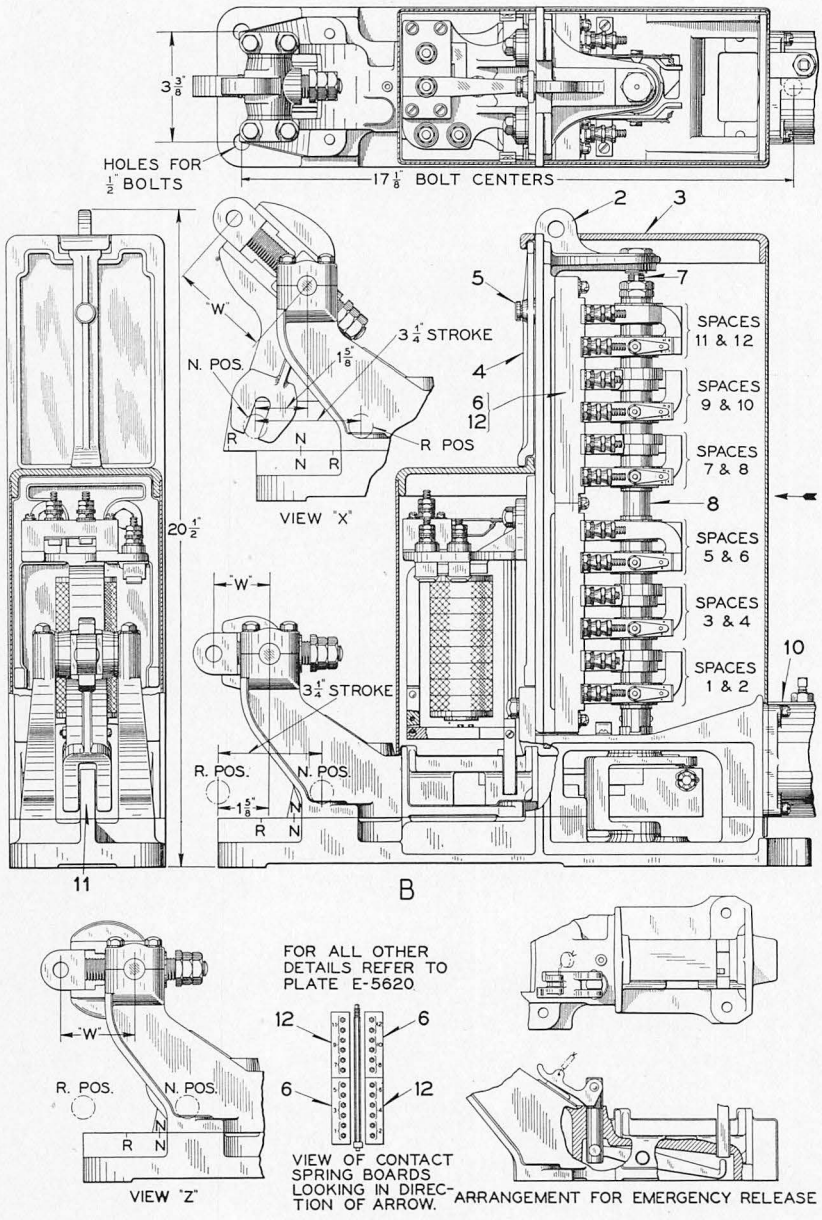
Piece	Ref.	Description	Drawing Reference
219988	**52d**	**Coil** 1750-Ohms for Ref. 10g	8133–129
195464	**52e**	**Coil** 2000-Ohms for Ref. 10h	8133–129
155841	**53**	**Separator** (Used when only one Contact is furnished) (Not shown)	8072–558
151478	**54**	**Cable Outlet**	B–10342–57
	55	**Machine Screw,** No. 14-24x¾" Fil. Hd. S. (Cad. Pl.) with ¼" Shakeproof Lock Washer (Internal Teeth) for Ref. 54.	
156425	**56**	**Right Hand Strap**	10914–169
156372	**57**	**Left Hand Strap**	10914–169
	58	**Cap Screw,** ⅜"-16x2" Hex. Hd. S. (Cad. Pl.) with ⅜" Shakeproof Lock Washer (Internal Teeth).	
150668	**59**	**Base** for Locks mounted below Rocker Link	C–9214–1
152852	**60**	**Main Operating Crank** for Locks mounted below Rocker Link of I. S. & F. and Style "A" Machines.	C–9214–12
153931	**61**	**Adjustable Arm** for Locks mounted below Rocker Link of I. S. & F. Machines	8034–192
187158	**61a**	**Adjustable Arm** for Locks mounted below Rocker Link of Style "A" Machines	8034–192
153932	**62**	**Adjusting Sleeve** for Locks mounted below Rocker Link of I. S. & F. and Style "A" Machines	8072–701
156833	**63**	**Adjustable Arm** for Locks mounted above Rocker Link of Style "A" Machines	8034–190
156814	**64**	**Main Operating Crank** for Locks mounted above Rocker Link of Style "A" Machines	C–9214–14
156834	**65**	**Adjusting Sleeve** for Locks mounted above Rocker Link of Style "A" Machines	8072–688
150372	**66**	**Backstrap** (Tapped for use of Screw Ref. 79)	8162–224
137982	**67**	**Magnet Bracket** (When armature contact is used)	C–9214–3

Style "ML-10" 6-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
151233	**67a**	**Magnet Bracket** (When armature contact is not used)	C–9214–3
141466	**68**	**Armature**	8157–349
187816	**69**	**Pin** for attaching Armature Ref. 68 to Backstrap Ref. 66 (not tapped for screw) Not shown, used on Locks furnished previous to 10-26-32. See Ref. 79 for later arrangement	8097–468
	70	**Machine Screw** No. 10-30x1¼" Fil. Hd. S. (Tin. Pl.) with Washer Ref. 70a for attaching Terminal Board to Magnet Bracket.	
73129	**70a**	**Washer** for Ref. 70	7826–180
49806	**71**	**Magnet Core**	8101–203
	72	**Cotter Pin,** $\frac{3}{32}$"x¾" S. (Cad. Pl.).	
185320	**73**	**Screw** with No. 8-36 Stop Steel Hex. Nut (Cad. Pl.) for attaching Locking Dog (drilled for screw) to Armature (Used since 10-26-32, see Ref. 28 for original Pin)	8098–260
212083	**74**	**Locking Dog** (For $\frac{5}{16}$" lift, tapped for use of Screw Ref. 73)	9121–121
	75	**Terminal Post** with Nuts and Washers (Inc. 1-32a, 3-18, 2-19 and 1-20)	12451–
33576	**76**	**Insulation**	8750–767
62984	**77**	**Insulation**	8078–1226
121616	**78**	**Washer**	8486–362
	79	**Screw** with No. 8 Pl. S. Lock Washer ($\frac{1}{16}$"x$\frac{3}{64}$") (Tin Pl.) and Nut Ref. 79b for attaching Armature Ref. 68 to Backstrap Ref. 66 (tapped for screw) For original Pin see Ref. 69	12471–
185319	**79a**	**Screw only,** for Ref. 79	8098–260
94344	**79b**	**Nut** for Ref 79	8265–70



Style "ML-10" 12-Way Forced Drop Electric Locks

Style "ML-10" 12-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

Unless otherwise specified all Locks will be furnished with Coils wound to 50-ohms resistance for operation on 10-Volts D.C; 6 Normal, 5 Reverse and 1 "BD" Contacts on Circuit Controller; without Emergency Release and Armature Contact. (Orders should specify Lock Bar required by referring to Plate E-5640).

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "ML-10" 12-Way Forced Drop Electric Lock. (Lock Bar as specified referring to Plate E-5640).

Piece	Ref.	Machine	Circuit Controller Contacts	Above or Below Floor Mount.	Remarks	"W" Dim.	Drawing Reference
	B	I.S. & F.	6N-5R&1BD	Above	As shown	$1\frac{3}{4}''$	C–9220–3
	Ba	Dwarf I.S. & F.	6N-5R&1BD	Above	As shown	$1\frac{3}{4}''$	C–9220–
	Bb	Style "A"	6N-5R&1BD	Above	Per View "Z"	$2\frac{5}{16}''$	C–9220–5
	***Bc**	I.S. & F.	Without	Above	As shown	$1\frac{3}{4}''$	C–9220–3
	***Bd**	Dwarf I.S. & F.	Without	Above	As shown	$1\frac{3}{4}''$	C–9220–
	***Be**	Style "A"	Without	Above	Per View "Z"	$2\frac{5}{16}''$	C–9220–5
	Bf	I.S. & F.	6N-5R&1BD	Below	Per View "X"	$3''$	C–9220–6
	Bg	Style "A"	6N-5R&1BD	Below	Per View "X"	$3\frac{1}{8}''$	C–9220–6
	***Bh**	I.S. & F.	Without	Below	Per View "X"	$3''$	C–9220–6
	***Bj**	Style "A"	Without	Below	Per View "X"	$3\frac{1}{8}''$	C–9220–6
	Bk	Johnson	6N-5R&1BD	Above	As shown	$1\frac{21}{32}''$	C–9220–

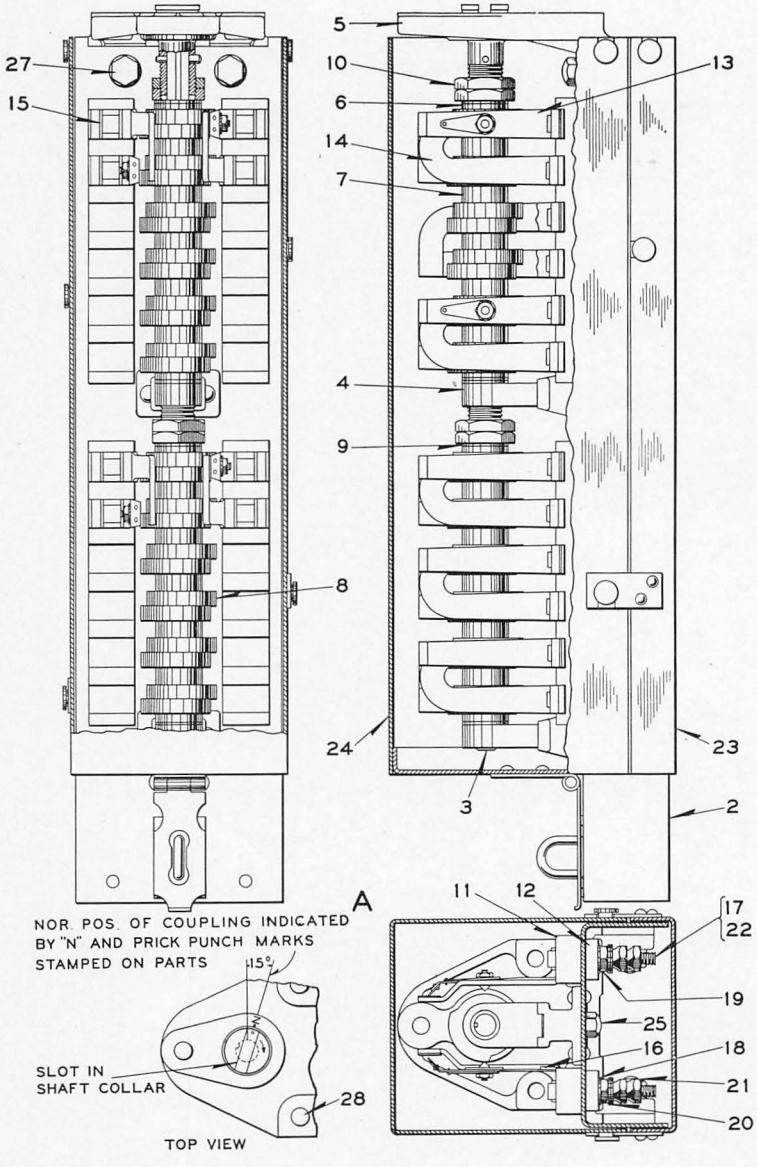
*Refs. Bc, Bd, Be, Bh and Bj do not include Refs. 6 and 7 of this Plate and Refs. 13, 14, 22 to 27, 29, 31, 32, 33, 36, 37, 38 and 72 of Plate E-5620.

Style "ML-10" 12-Way Forced Drop Electric Locks for Mounting on I. S. & F., Dwarf I. S. & F., Style "S-8", Johnson and Style "A" Interlocking Machines

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
154725	**2**	**Circuit Controller Bearing**	C–9214–13
220363	**2a**	**Circuit Controller Bearing** (Without holes for mounting Magnet Assembly) When Magnet assembly is not required for Locks mounted below Rocker Link	C–9214–13
155107	**3**	**Circuit Controller Cover**	C–9214–8
145427	**4**	**Cover Latch**	C–9214–12
155138	**5**	**Stud**	8114–705
108238	**6**	**Contact Spring Board** (2 req'd)	9968–1171
155114	**7**	**Shaft**	12501–32
150838	**8**	**Separator**	8072–558
156651	**10**	**Cable Outlet**	B–10342–62
	11	**Lock Bar** (For details refer to Plate E-5640)	C–9219–
108956	**12**	**Contact Spring Board** (2 req'd)	9968–1261
		NOTE: For other details refer to Plate E-5620.	



Auxiliary Circuit Controller

Style "ML-10" Forced Drop Electric Locks

Detail Parts

Auxiliary Circuit Controllers

Unless otherwise specified all 6-Way Controllers will be furnished with three normal and three reverse contacts and the 12-Way Controller with six normal and six reverse contacts.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

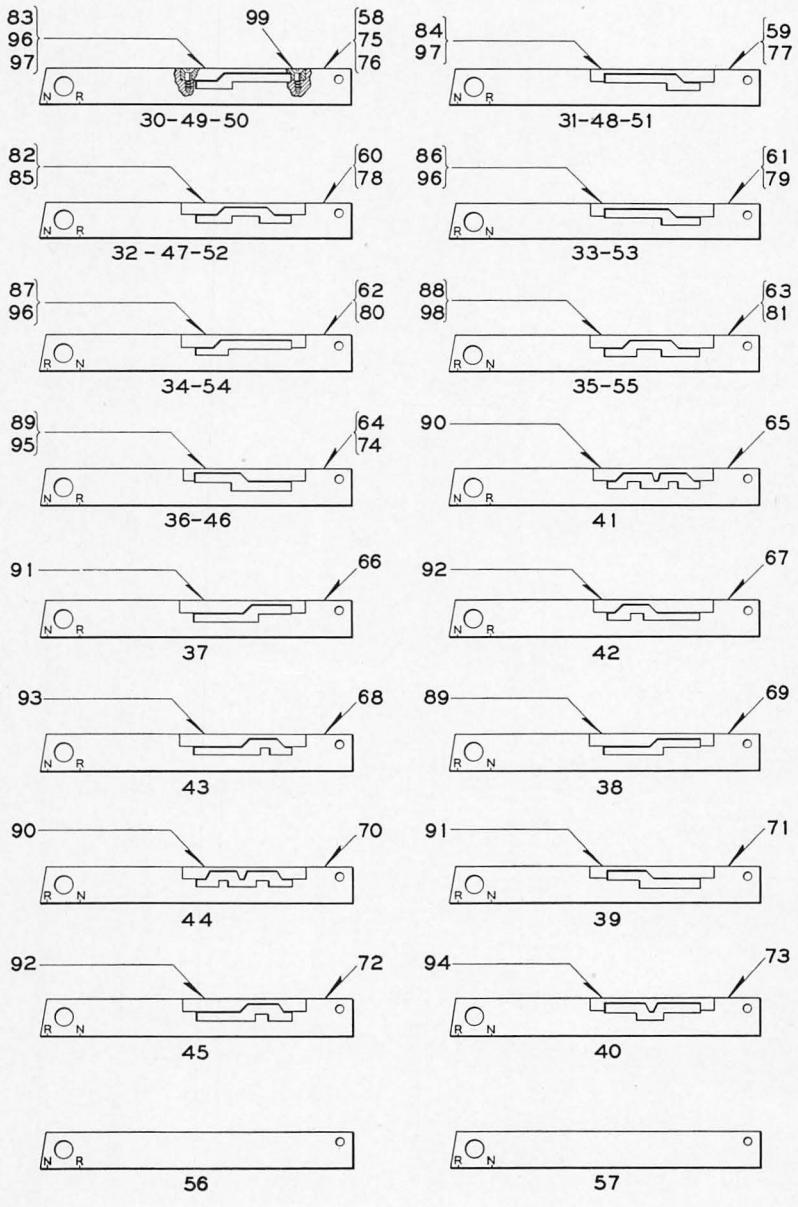
Piece	Ref.	Description	Drawing Reference
154534	**A**	**Auxiliary Circuit Controller, 12-Way with Six Normal and Six Reverse Contacts** (Without Tap Bolts Ref. 28)	C–9218–1
154535	**Aa**	**Auxiliary Circuit Controller, 6-Way with Three Normal and Three Reverse Contacts in Upper Half of 12-Way Case** (Without Tap Bolts Ref. 28)	C–9218–1
154527	**2**	**Frame Complete**	C–9240–2
154519	**3**	**Shaft Complete**	C–9240–1
154517	**4**	**Bearing**	C–9240–1
151044	**5**	**End Bracket**	C–9240–1
150612	**6**	**Cam Adjustment Collar**	8065–203
150394	**7**	**Cam Adjustment Collar**	8065–202
150397	**8**	**Cam**	8750–2307
38669	**9**	**Washer**	7828–171
154533	**10**	**Nut**	8265–232
154520	**11**	**Front Terminal Board**	9968–900
154521	**12**	**Back Terminal Board**	9968–899
150609	**13**	**Contact Spring Complete**	8385–2150
150606	**14**	**Contact Post Complete**	8094–2208
154522	**15**	**Lock Washer**	8486–386
155129	**16**	**Stop Spring**	8735–319
	17	**Terminal Post with Nuts and Washers** (Inc. 1-17a, 1-18, 1-19, 2-20 and 2-21)	12451–
130200	**17a**	**Terminal Post only,** for Ref. 17	8094–1192
29104	**18**	**Washer**	7828–138

Style "ML-10" Forced Drop Electric Locks
Detail Parts
Auxiliary Circuit Controllers

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
29103	**19**	**Nut**	8109–194
29102	**20**	**Washer**	7828–139
29101	**21**	**Nut**	8109–193
42253	**22**	**Ins. Tubing**	B–10270–1
154531	**23**	**Back Cover Complete**	C–9240–4
154529	**24**	**Front Cover Complete**	C–9240–3
	25	**Cap Screw,** $\frac{5}{16}$″-18x1$\frac{3}{8}$″ Hex. Hd. S. (Cad. Pl.) with $\frac{5}{16}$″ Shakeproof Lock Washer.	
	26	**Machine Screw,** $\frac{5}{16}$″-18x1″ Flat Hd. S. (Cad. Pl.) with $\frac{5}{16}$″ Hex. Nut (Cad. Pl.) and $\frac{5}{16}$″ Shakeproof Lock Washer (Not shown). For attaching Frame Ref. 2 to End Bracket Ref. 5.	
	27	**Cap Screw,** $\frac{3}{8}$″-16x$\frac{1}{2}$″ Hex. Hd. S. (Cad. Pl.) with $\frac{3}{8}$″ Shakeproof Lock Washer.	
	28	**Tap Bolt,** $\frac{3}{8}$″-16x1$\frac{1}{4}$″ Hex. Hd. S. (Cad. Pl.) with $\frac{3}{8}$″ Plain S. Lock Washer ($\frac{11}{64}$″x$\frac{7}{64}$″) for fastening Auxiliary Circuit Controller to Lock.	



Lock Bars for Style "ML-10" Forced Drop Electric Locks

Style "ML-10" Forced Drop Electric Locks

Detail Parts

Lock Bars

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Lock Bar for Locking Lever of I. S. & F. or Style "A" Machines.
Permits $\frac{7}{16}$" lift of lever latch and $\frac{5}{16}$" lift of locking dog.

Piece	Ref.	Arranged for Locking Lever	For Lock Mounted—Rocker Link	Drawing Reference
215804	**30**	Normal	Above	C–9219–11
193130	**31**	Reverse	Above	C–9219–9
215805	**32**	Normal and Reverse	Above	C–9219–11
215808	**33**	Normal	Below	C–9219–11
215807	**34**	Reverse	Below	C–9219–11
215806	**35**	Normal and Reverse	Below	C–9219–11

Lock Bar for Locking Lever of I. S. & F. or Style "A" Machines.
May be used in locks having either $\frac{7}{32}$" or $\frac{5}{16}$" lift of locking dog.

Piece	Ref.	Arranged for Locking Lever	For Lock Mounted—Rocker Link	Drawing Reference
150731	**36**	Latch Up Normal	Above	C–9219–1
163366	**37**	Latch Up Reverse	Above	C–9219–5
162711	**38**	Latch Up Normal	Below	C–9219–5
161600	**39**	Latch Up Reverse	Below	C–9219–4
162717	**40**	Latch Up Normal and Latch Up Reverse	Below	C–9219–5

Style "ML-10" Forced Drop Electric Locks

Detail Parts

Lock Bars

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Lock Bar for Locking Lever of I. S. & F. or Style "A" Machines.
Permits $\frac{3}{16}$" lift of lever latch and $\frac{5}{16}$" lift of locking dog.

Piece	Ref.	Arranged for Locking Lever	For Lock Mounted—Rocker Link	Drawing Reference
157942	**41**	Normal, Latch Up Normal, Latch Up Reverse and Reverse	Above	C–9219–4
157022	**42**	Normal and Latch Up Normal	Above	C–9219–4
213193	**43**	Reverse and Latch Up Reverse	Above	C–9219–9
154746	**44**	Normal, Latch Up Normal, Latch Up Reverse and Reverse	Below	C–9219–3
178194	**45**	Normal and Latch Up Normal	Below	C–9219–6

Lock Bar for Locking Lever of I. S. & F. Dwarf Machine.
Permits $\frac{5}{16}$" lift of locking dog and $\frac{3}{16}$" lift of lever latch.

Piece	Ref.	Arranged for Locking Lever	For Lock Mounted—Rocker Link	Drawing Reference
152088	**46**	Latch Up Normal	Above	C–9219–2
155140	***47**	Normal and Reverse	Above	C–9219–3
212089	**48**	Reverse	Above	C–9219–10

*Used with Machine having no mechanical locking.

Style "ML-10" Forced Drop Electric Locks

Detail Parts

Lock Bars

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Lock Bar for Locking Lever of I. S. & F. or Style "A" Machines.
Permits $\frac{3}{16}$" lift of lever latch. (For Locks furnished previous to 12-1-39).

Piece	Ref.	Arranged for Locking Lever	For Lock Mounted —Rocker Link	Lift of Locking Dog	Drawing Reference
161046	**49**	Normal	Above	$\frac{7}{32}$"	C–9219–4
106702	**50**	Normal	Above	$\frac{5}{16}$"	C–9219–11
212089	**51**	Reverse	Above	$\frac{5}{16}$"	C–9219–10
155140	**52**	Normal and Reverse	Above	$\frac{5}{16}$"	C–9219–3
162715	**53**	Normal	Below	$\frac{7}{32}$"	C–9219–5
161161	**54**	Reverse	Below	$\frac{7}{32}$"	C–9219–3
154797	**55**	Normal and Reverse	Below	$\frac{7}{32}$"	C–9219–3

Piece	Ref.	Description	Drawing Reference
188538	**56**	**Bar** (No Locking) used to operate Circuit Controller mounted above Rocker Link	C–9219–6
218549	**57**	**Bar** (No Locking) used to operate Circuit Controller mounted below Rocker Link	C–9219–12
215794	**58**	**Lock Bar only** for Ref. 30	C–9219–8
193128	**59**	**Lock Bar only** for Ref. 31	C–9219–8
215795	**60**	**Lock Bar only** for Ref. 32	C–9219–8
215798	**61**	**Lock Bar only** for Ref. 33	C–9219–8
215797	**62**	**Lock Bar only** for Ref. 34	C–9219–8
215796	**63**	**Lock Bar only** for Ref. 35	C–9219–8
212086	**64**	**Lock Bar only** for Ref. 36	C–9219–10
188527	**65**	**Lock Bar only** for Ref. 41	C–9219–7

Style "ML-10" Forced Drop Electric Locks

Detail Parts

Lock Bars

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
188533	**66**	**Lock Bar only** for Ref. 37	C–9219–8
188537	**67**	**Lock Bar only** for Ref. 42	C–9219–8
213194	**68**	**Lock Bar only** for Ref. 43	C–9219–8
188530	**69**	**Lock Bar only** for Ref. 38	C–9219–7
188525	**70**	**Lock Bar only** for Ref. 44	C–9219–7
188529	**71**	**Lock Bar only** for Ref. 39	C–9219–7
188536	**72**	**Lock Bar only** for Ref. 45	C–9219–8
188532	**73**	**Lock Bar only** for Ref. 40	C–9219–7
188524	**74**	**Lock Bar only** for Ref. 46	C–9219–7
188528	**75**	**Lock Bar only** for Ref. 49	C–9219–7
106701	**76**	**Lock Bar only** for Ref. 50	C–9219–11
212087	**77**	**Lock Bar only** for Refs. 48 and 51	C–9219–10
188526	**78**	**Lock Bar only** for Refs. 47 and 52	C–9219–7
188531	**79**	**Lock Bar only** for Ref. 53	C–9219–7
188535	**80**	**Lock Bar only** for Ref. 54	C–9219–8
188523	**81**	**Lock Bar only** for Ref. 55	C–9219–7
236165	**82**	**Depressor Plate** for Refs. 47 and 52	12672–21
215799	**83**	**Depressor Plate** for Ref. 30	12672–17
188546	**84**	**Depressor Plate** for Ref. 31	12672–15
215800	**85**	**Depressor Plate** for Ref. 32	12672–17
215803	**86**	**Depressor Plate** for Ref. 33	12672–19
215802	**87**	**Depressor Plate** for Ref. 34	12672–18
215801	**88**	**Depressor Plate** for Ref. 35	12672–18

Style "ML-10" Forced Drop Electric Locks

Detail Parts

Lock Bars

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
188539	**89**	**Depressor Plate** for Refs. 36 and 38	12672–12
188542	**90**	**Depressor Plate** for Refs. 41 and 44	12672–13
212084	**91**	**Depressor Plate** for Refs. 37 and 39	12672–16
188544	**92**	**Depressor Plate** for Refs. 42 and 45	12672–14
215809	**93**	**Depressor Plate** for Ref. 43	12672–19
188545	**94**	**Depressor Plate** for Ref. 40	12672–15
188540	**95**	**Depressor Plate** for Ref. 46	12672–12
188541	**96**	**Depressor Plate** for Refs. 49, 53 and 54	12672–13
212085	**97**	**Depressor Plate** for Refs. 48, 50 and 51	12672–16
188543	**98**	**Depressor Plate,** for Ref. 55	12672–14
	99	**Machine Screw,** 1/4"-20x7/8" Flat Hd. S.	

Union Style "SL-20" and Style "SL-21A" Electric Switch Locks

The function of the Union Style "SL-20" and Style "SL-21A" Electric Locks is to prevent the operation of the hand throw lever of a switch stand until an electrical unlock, assuring safety, has been given. These locks are designed for application to levers of low switch stands in general use. Typical layouts are shown in Plate E-5700.

These locks are interchangeable in many respects; but differ in that the Style "SL-20" is electrically unlocked as long as its control circuit is closed, while the Style "SL-21A" requires that the padlock be removed from the lever latch to complete the control circuit.

Standard Style "SL-20" and Style "SL-21A" Locks are equipped with two back contacts operated by the armature. One of these contacts may be a front contact if desired.

The standard Style "SL-21A" Lock (in addition to having two independent contacts operated by the lock armature) is equipped with one normally open contact for control of lock magnets and two independent, normally closed contacts for signal control. These contacts are operated by the preliminary motion of the lever latch which automatically operates when the padlock is removed. All three contacts may be normally open if specified.

Right-hand lock assemblies have been found applicable to practically all hand-throw stands or switch mechanisms. If necessary, owing to the design of some special stands or when a lock rod support is used, left-hand lock assemblies may be provided. The Lock Rod Support must be mounted on the hinge side of the Switch Lock. The type of lock can be distinguished by viewing the lock from the foot pedal side: right-hand lock has hinges to the right, left-hand lock has hinges to the left.

OPTIONAL EQUIPMENT FOR LOCKS

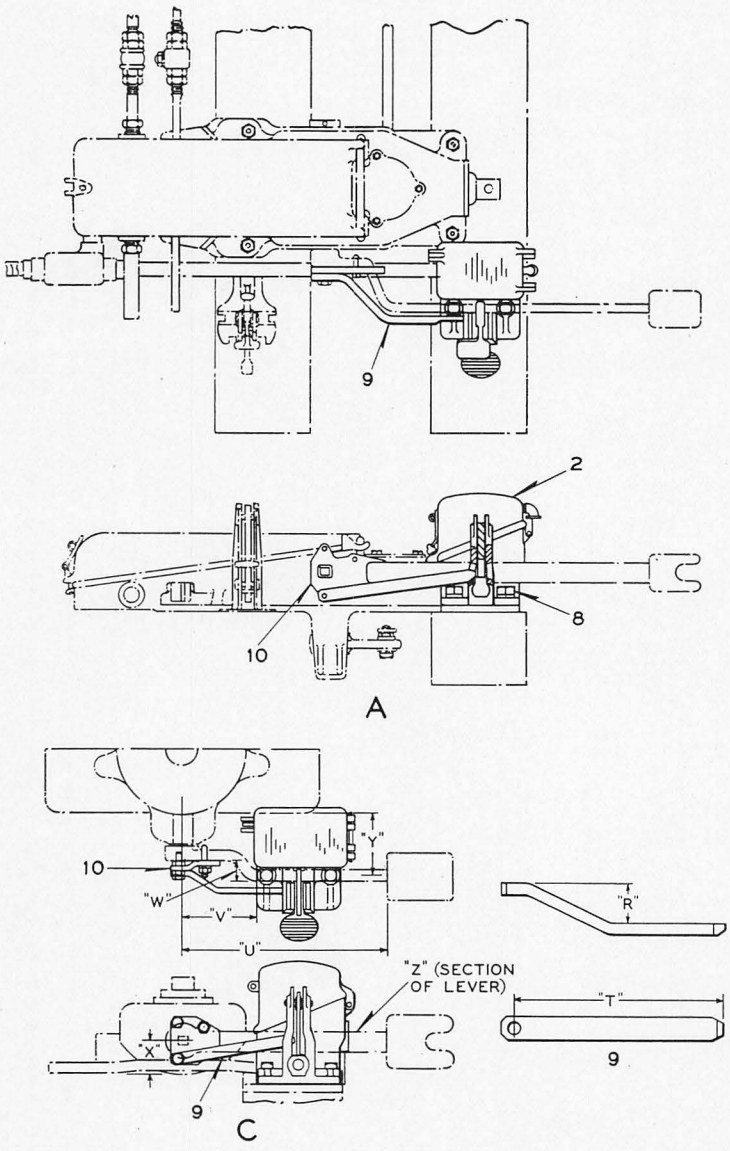
Lock Rod Support

A lock rod support may be provided as shown in Ref. 51, Plate E-5720-3 and when used the lock rod is locked by the hand

lever when in the normal position. This feature is not required when Styles "T-10", "T-11", "T-20" or "T-21" mechanisms are used, as mechanical locking of facing points in normal position is one of their functions.

Emergency Key Release

Emergency Key Releases of two types may be applied as shown in Plate E-5720-3. View "X" shows an emergency release actuated by a Yale type key which is usually kept in the office of a Supervisory Officer in the vicinity of the switch lock. View "W" shows an emergency release operated by a standard switch key which can only be applied after a standard car seal has been broken.



Applications of Styles "SL-20" and "SL-21A" Electric Switch Locks to Switch Mechanisms

Applications of Styles "SL-20" and "SL-21A" Electric Switch Locks to Switch Mechanisms

When applying locks to switch stands having the same functions as that shown in Reference C or Ca, the orders should be accompanied with dimensioned print of movement showing:

(1) Dimension "X"—distance from top of tie to center of lever hub.

(2) Dimension "Y"—distance from edge of base of movement to center of hand-throw lever.

(3) Dimension "Z"—section of lever.

(4) Other lever dimensions:

(a) "U" —from center of lever hub to counterweight.

(b) "V" —Distance between centerline of hub and end of hand-throw lever offset.

(c) "W" —Offset of hand-throw lever. If there is no offset in existing lever orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

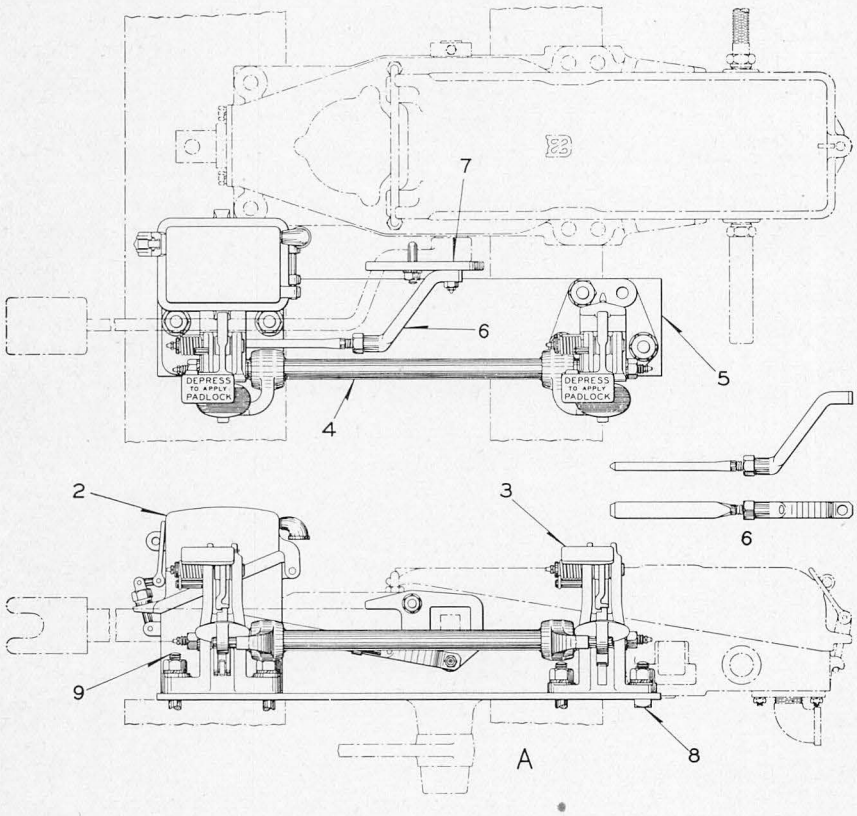
Piece	Ref.	Description	Drawing Reference
	A	**Style "SL-20" Electric Switch Lock** with Lever Lock Rod, Support and Lag Screws for applying to Style "T-10" or "T-11" hand operated Switch Mechanism (Inc. 1-2, 2-8, 1-9 and 1-10) (Orders should specify Lock required by referring to Plate E-5710)	C–9182–
	Aa	**Style "SL-21A" Electric Switch Lock** with Lever Lock Rod, Support and Lag Screws for applying to Style "T-10" or "T-11" hand operated Switch Mechanism (Inc. 1-2b, 2-8, 1-9 and 1-10) (Orders should specify Lock required by referring to Plate E-5710)	C–9182–
	Ab	**Style "SL-20" Electric Switch Lock** with Lever Lock Rod, Support and Lag Screws for applying to Style "T-20" or "T-21" hand operated Switch Mechanism (Inc. 1-2, 2-8, 1-9 and 1-10) (Orders should specify Lock required by referring to Plate E-5710)	C–16698–
	Ac	**Style "SL-21A" Electric Switch Lock** with Lever Lock Rod, Support and Lag Screws for applying to Style "T-20" or "T-21" hand operated Switch Mechanism (Inc. 1-2b, 2-8, 1-9 and 1-10) (Orders should specify Lock required by referring to Plate E-5710)	C–16698–
	C	**Style "SL-20" Electric Switch Lock** with Lever Lock Rod, Support and Lag Screws for applying to hand throw Switch Stand (Inc. 1-2, 2-8, 1-9 and 1-10) (Orders should specify Lock required by referring to Plate E-5710)	C–16704–

Applications of Styles "SL-20" and "SL-21A" Electric Switch Locks to Switch Mechanisms

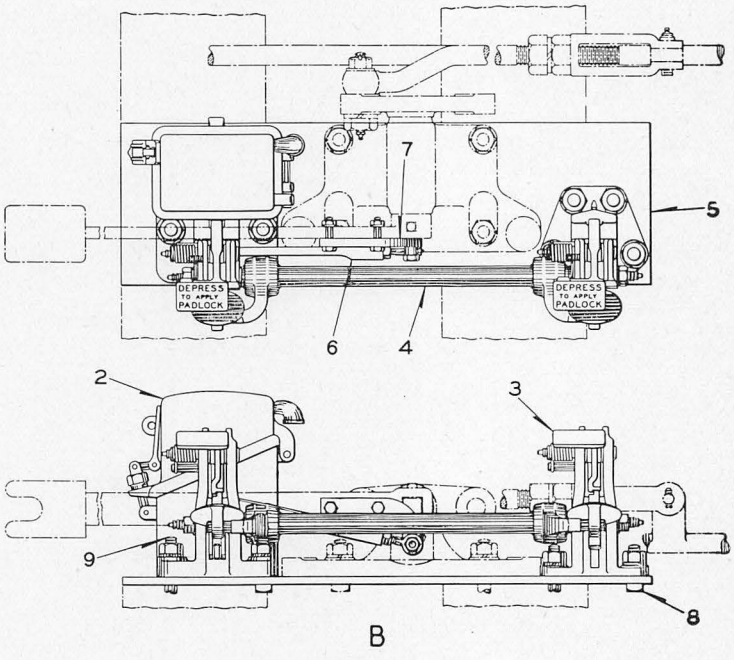
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	Ca	**Style "SL-21A" Electric Switch Lock** with Lever Lock Rod, Support and Lag Screws for applying to hand throw Switch Stand (Inc. 1-2b, 2-8, 1-9 and 1-10) (Orders should specify Lock required by referring to Plate E-5710)	C–16704–
	2	**Style "SL-20" Electric Switch Lock** (When ordering refer to Plate E-5710)	C–16831–
	2b	**Style "SL-21A" Electric Switch Lock** (When ordering refer to Plate E-5710)	C–16831–
	8	**Lag Screw,** ¾"x6".	
	9	**Lever Lock Rod.** (Orders for rods for repair should specify dimension (T) from center of hole to end of rod and (R) set in rod)	C–6967–
	10	**Lever Lock Rod Support Complete** (Orders for supports for repairs should specify type of movement with which it is to be used)	C–6967–



Application of Style "SL-21A" Lock and Tandem Latch Stand to "T-20" Switch Mechanism



Application of Style "SL-21A" Lock and Tandem Latch Stand to Ground Lever Stand

Application of Style "SL-21A" Electric Switch Lock and Tandem Latch Stand to Ground Levers and Low Switch Mechanisms

Application of "SL-21A" Lock not arranged for tandem operation will be found on Plate E-5700.

The tandem arrangement may be applied to any Ground Lever or low Switch Mechanism. Orders for Lock and Tandem Latch to be applied to any of our switch mechanisms or ground levers should be accompanied by dimensioned print of layout or refer to application drawing so proper fittings can be furnished. Orders for Lock and Tandem Latch to be applied to Ground Levers or Mechanisms other than U. S. & S. Co. manufacture should be accompanied with dimensioned print of layout and print of switch stand showing:

(1) Distance from top of the tie to center of lever hub.

(2) Distance from edge of base of movement to center of hand-throw lever.

(3) Section of lever.

(4) Other lever dimensions:

(a) From center of lever hub to counterweight.

(b) Distance between centerline of hub and end of hand-throw lever offset.

(c) Offset of hand-throw lever. If there is no offset in existing lever orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

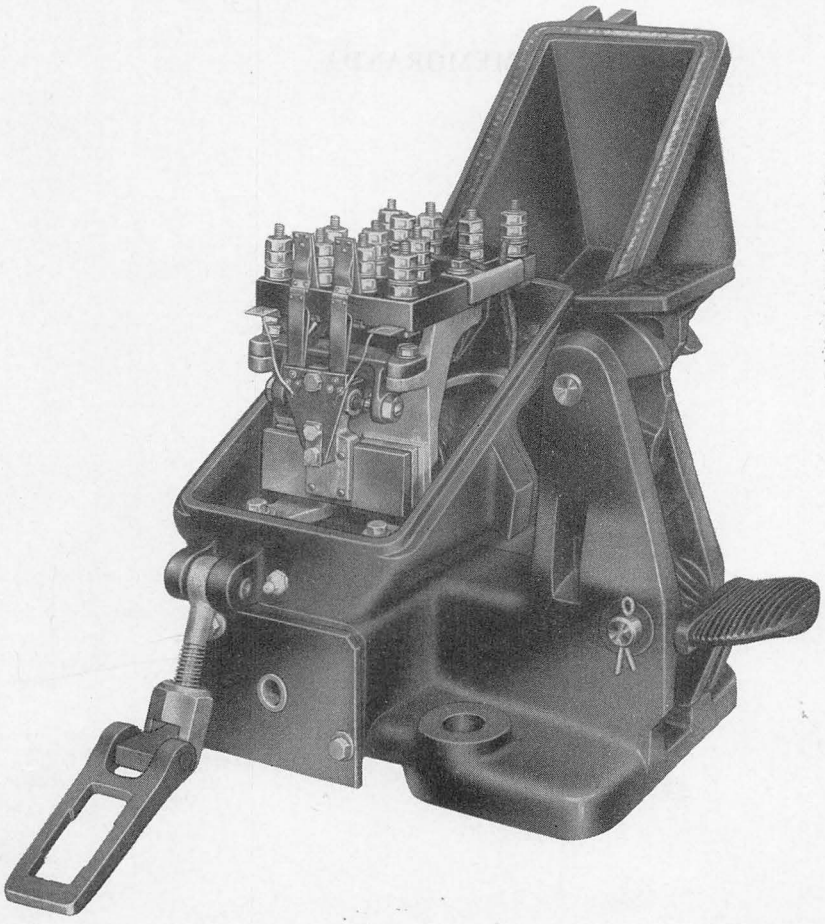
Piece	Ref.	Description	Drawing Reference
	A	**Style "SL-21A" Electric Switch Lock and Tandem Latch Stand** with Base Plate, Rocker Shaft, Lever Lock Rod and Support for applying to Style "T-20" or "T-21" hand operated Switch Mechanism (Inc. 1-2, 1-3, 1-4, 1-5, 1-6, 1-7 and Bolts Refs. 8 and 9) (Orders should specify Lock desired by referring to Plate E-5710 stating "arranged for tandem operation")	C–16698–
	B	**Style "SL-21A" Electric Switch Lock and Tandem Latch Stand** with Base Plate, Rocker Shaft, Lever Lock Rod and Support for applying to Ground Lever shown on Plate C-42 (Inc. 1-2, 1-3, 1-4, 1-5, 1-6, 1-7 and Bolts Refs. 8 and 9) (Orders should specify Lock desired by referring to Plate E-5710 stating "arranged for tandem operation")	C–16704–
	2	**Style "SL-21A" Electric Switch Lock** (When ordering refer to Plate E-5710 stating "arranged for tandem operation") (Details of "SL-21A" Switch Lock arranged for tandem operation will be found on Plate E-5720-4)	C–16831–4
	3	**Tandem Latch Stand Complete.** When ordering refer to Plate E-5720-4	C–16880–1
	4*	**Rocker Shaft Complete**	C–16881–

Application of Style "SL-21A" Electric Switch Lock and Tandem Latch Stand to Ground Levers and Low Switch Mechanisms

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	5*	**Base Plate**	B–9375–
	6*	**Lever Lock Rod**	C–6967–
	7*	**Lever Lock Rod Support Complete**	C–6967–
	8	**Machine Bolt,** ¾″ Hex. Hd. with ¾″ Plain S. Lock Washer and ¾″ Hex. Nut (Orders should specify length of bolt desired).	
	9	**Machine Bolt,** ¾″ Sq. Hd. with ¾″ Plain S. Lock Washer and ¾″ Hex. Nut (Orders should specify length of bolt desired).	
		*Orders for repair parts should refer to application drawing and type of ground lever stand.	



C-Style "SL-20" Electric Switch Lock
D-Style "SL-21A" Electric Switch Lock
(As Shown)

Style "SL-20" and Style "SL-21A" Electric Switch Locks

Locks of the following resistances will operate at or above the voltages indicated.

Minimum allowable service voltage at lock	Resistance per pair of coils	Minimum allowable service voltage at lock	Resistance per pair of coils
2.06	50	5.0	280
2.5	75	6.4	440
3.2	120	7.95	670
4.0	180	9.63	1000

Style "SL-20" and Style "SL-21A" Electric Switch Locks

For applications to Switch Mechanisms refer to Plate E-5700.

For details refer to Plate E-5720-1 and E-5720-3.

For Magnet Assembly details refer to Plate E-5725.

Standard assemblies are tabulated below, if any of the following alternatives are desired, orders should so state.

1. **With one front and one back independent armature contacts.**
2. **With three front latch operated contacts.**
3. **With Lock Rod Support Ref. 51, Plate E-5720-3, for application to hand throw movement.**
4. **Case arranged for use with 1″ thick lever.**
5. **Left-hand Assembly.**

*6. **With Key Release per View "X" or "W" of Plate E-5720-3.**

***When ordering Sealed Key Release furnish us with samples of Seals to be used and a new key.**

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

R. H. Style "SL-20" Electric Switch Lock Ref..... having Coils....-Ohms per pair, Case for use with ¾″ thick Lever and with....Hole in Lever Latch. (See Refs. 10, 10a, 10b and 11 of Plate E-5720-1).

Piece	Ref.	Magnet Assembly			Drawing Reference
		Ref..... Plate E-5725	Coils (Ohms per Pair)	Armature Contacts	
	C	D	50	2 Back	C–16831–
	Ca	Da	75	2 Back	C–16831–
	Cb	Db	120	2 Back	C–16831–
	Cc	Dc	180	2 Back	C–16831–
	Cd	Dd	280	2 Back	C–16831–
	Ce	De	440	2 Back	C–16831–
	Cf	Df	670	2 Back	C–16831–
	Cg	Dg	1000	2 Back	C–16831–

Roads desiring SL-21 Locks should refer to D to Dg of this Plate stating "Similar to Ref. .. Plate E-5710 except SL-21 with .. Hole in Lever Latch" (See Refs.54,54a, 54b,54c and 57 of Plate E-7520-2)

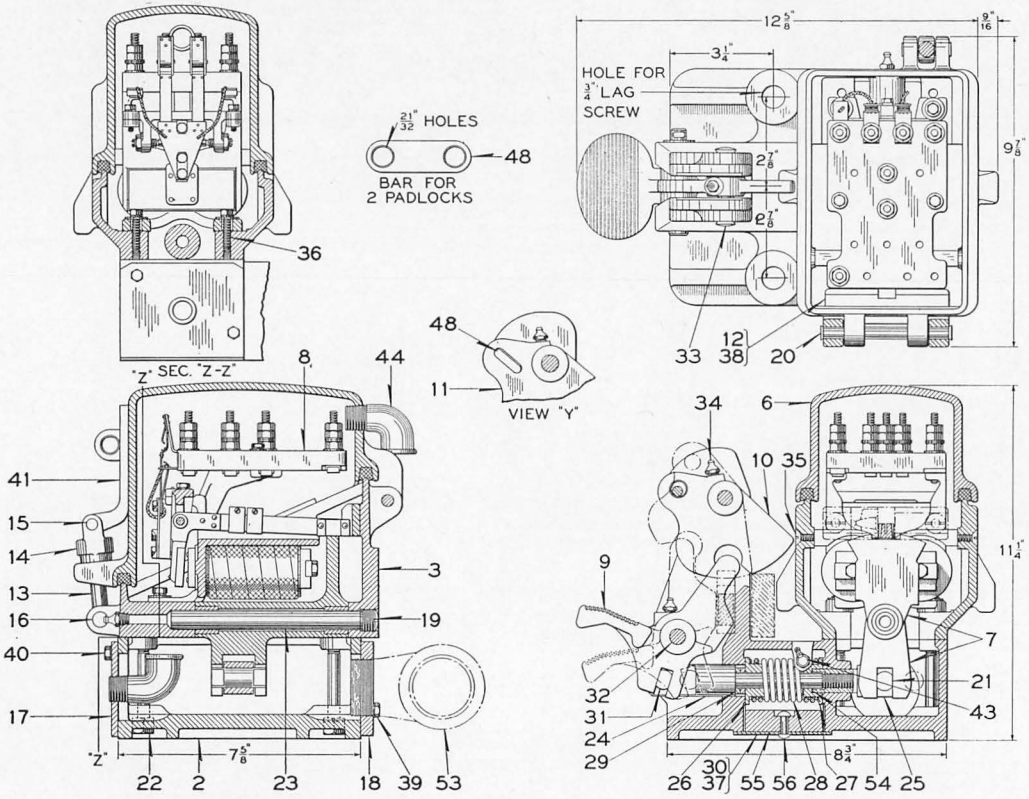
Style "SL-20" and "SL-21A" Electric Switch Locks

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

R.H. Style "SL-21A" Electric Switch Lock Ref.... having Coils....-Ohms per Pair, Case for use with 3/4" thick Lever and with ..... Hole in Lever Latch. (See Refs. 66 and 81 of Plate E-5720-3).

Piece	Ref.	Magnet Assembly				Drawing Reference
		Ref.... Plate E-5725	Coils (Ohms per Pair)	Armature Contacts	Latch Operated Contacts	
	D	C	50	2 Back	1 Front and 2 Back	C–16831–
	Da	Ca	75	2 Back	1 Front and 2 Back	C–16831–
	Db	Cb	120	2 Back	1 Front and 2 Back	C–16831–
	Dc	Cc	180	2 Back	1 Front and 2 Back	C–16831–
	Dd	Cd	280	2 Back	1 Front and 2 Back	C–16831–
	De	Ce	440	2 Back	1 Front and 2 Back	C–16831–
	Df	Cf	670	2 Back	1 Front and 2 Back	C–16831–
	Dg	Cg	1000	2 Back	1 Front and 2 Back	C–16831–



Style "SL-20" Electric Switch Lock

Style "SL-20" Electric Switch Locks

Detail Parts

Ordering references for complete Locks will be found on Plate E-5710

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
183422	**2**	**Base**	C–9423–1
183424	**3**	**Case** (Without holes for attaching Lock Rod Support or Key Release) For use with ¾" thick lever	C–9423–2
216402	**3a**	**Case** (Without holes for attaching Lock Rod Support or Key Release) For use with 1" thick lever	C–9423–2
183529	**6**	**Cover** with Gasket Ref. 6a	C–9423–3
	6a	**Gasket,** ⅜" Sq. Woven Flax Packing, 2' 2½" long.	
184103	**7**	**Sector** (M. I. Pat. T-183425A) with Bushings Ref. 7a for Style "SL-20" Lock	C–9423–4
7225	**7a**	**Bushing** for Ref. 7	8350–94
	8	**Magnet and Contact Spring Assembly** (For references and details refer to Ref. D, Plate E-5725)	C–9423–8
183428	**9**	**Foot Lever** (M. I. Pat. T-183428B)	C–9423–5
183429	**10**	**Lever Latch** (with ½" hole) (M. I. Pat. 183429B)	C–9423–5
185530	**10a**	**Lever Latch** (with ⅝" hole) (M. I. Pat. 183429B)	C–9423–5
230170	**10b**	**Lever Latch** (with ½"x⅝" slotted hole) (M. I. Pat. 183429B)	C–9423–5
197546	**11**	**Lever Latch** with Slotted Hole (Arranged for Locking Bar) (M. I. Pat. 183429B) (See View "Y")	C–9423–5
183696	**12**	**Armature Bar Stop**	C–9423–6
64973	**13**	**Eye Bolt**	8034–64
183531	**14**	**Nut**	8082–193
213854	**15**	**Pin**	B–10202–1
209949	**16**	**Pin**	B–10207–1
183431	**17**	**Cover Plate** with ½" Pipe Tap	9999–1048
183430	**18**	**Wire Inlet Plate** with 1½" Pipe Tap	C–9423–6

Style "SL-20" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
235228	**18a**	**Wire Inlet Plate** with 1¼″ Pipe Tap	9999–1897
183525	**19**	**Plug**	9511–124
209305	**20**	**Pin**	B–10207–1
183522	**21**	**Pin**	8057–207
	22	**Bolt,** ⅜″-16x3¼″ Hex. Hd. S. with ⅜″ Pl. S. Lock Washer (11/64″x7/64″).	
183524	**23**	**Shaft**	12501–90
183526	**24**	**Eye Bolt**	8034–217
183527	**25**	**Eye Bolt**	8034–218
183523	**26**	**Collar**	8072–771
183814	**27**	**Collar**	8072–771
211689	**28**	**Coil Spring**	7770–508
183530	**29**	**Separator**	8072–700
214161	**30**	**Cover Plate**	9999–126
184180	**31**	**Pin**	8057–208
	32	**Pin** Ref. 32a with Washer Ref. 32b and 3/16″x1⅛″ S. Cotter (Tin Pl.)	8058–222
107544	**32a**	**Pin Only**	8058–222
7309	**32b**	**Washer**	7826–12
209420	**33**	**Pin**	B–10213–1
	34	**Lubricating Fitting,** ⅛″ P. T. Straight Hydraulic Type.	
	35	**Machine Screw,** No. 14-24x⅞″ Flat Hd. Br. (N. P.).	
	36	**Tap Bolt,** ¼″-20x1⅛″ Hex. Hd. S. with ¼″ Pl. S. Lock Washer (9/64″x5/64″) (Tin Pl.) and ¼″ S. Plate Washer (Tin Pl.).	

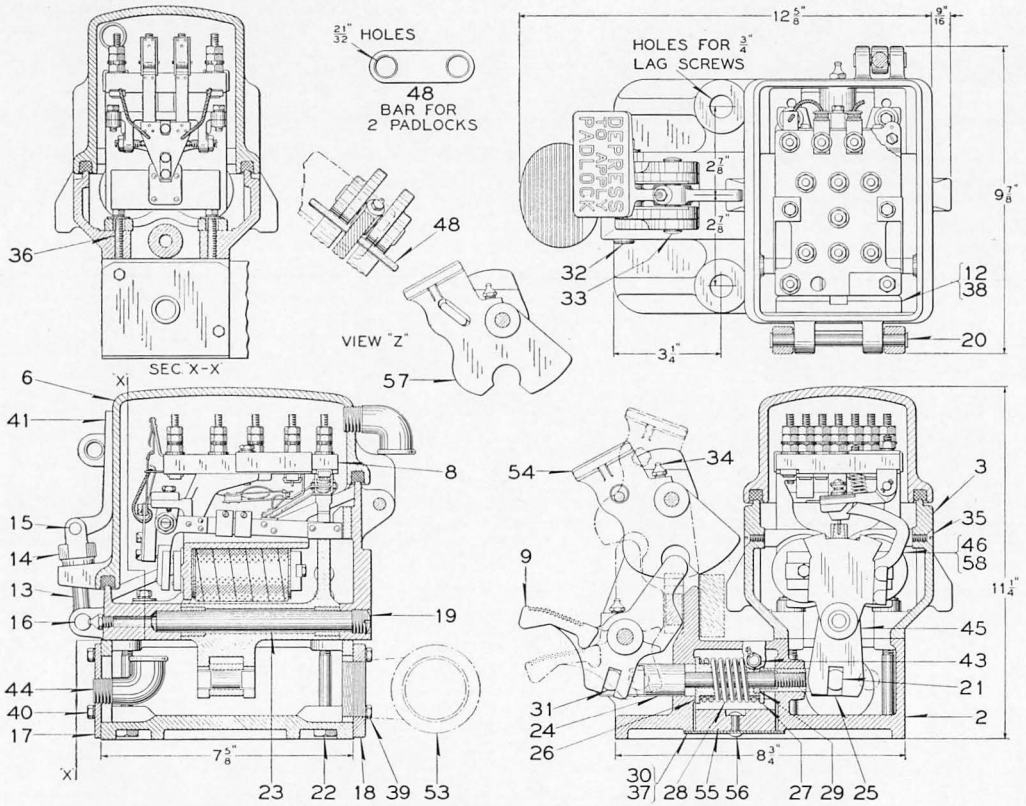
Style "SL-20" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	37	**Machine Screw,** No. 10-30x$\frac{7}{16}$" Flat Hd. S. (Tin Pl.) for attaching Ref. 30 to Base.	
	38	**Machine Screw,** $\frac{5}{16}$"-18x$\frac{7}{8}$" Flat Hd. S. (Cad. Pl.) for attaching Ref. 12 to Case.	
	39	**Tap Bolt,** $\frac{1}{4}$"-20x$\frac{7}{8}$" Hex. Hd. S. (Tin Pl.) with $\frac{1}{4}$" Pl. S. Lock Washer ($\frac{9}{64}$"x$\frac{5}{64}$") (Tin Pl.) For attaching Ref. 18 to Base.	
	40	**Tap Bolt,** $\frac{1}{4}$"-20x$\frac{5}{8}$" Hex. Hd. S. (Tin Pl.) with $\frac{1}{4}$" Pl. S. Lock Waser ($\frac{9}{64}$"x$\frac{5}{64}$") (Tin Pl.) For attaching Refs. 17 and 18a to Base.	
16267	**41**	**Hasp**	8299–26
	43	**Lubricating Fitting,** $\frac{1}{8}$" P. T., 67$\frac{1}{2}$° Hydraulic Type	
70109	**44**	**Ventilator**	7318–57
197545	**48**	**Locking Bar** for use with two padlocks	9999–1210
234715	**48a**	**Locking Bar** with Chain. For use with one padlock, chain attaches to tie	9999–1703
	53	**Street Ell,** 1$\frac{1}{2}$" Galv.	
210158	**54**	**Washer.** Used as required to eliminate lost motion in the centering spring	7826–309
214162	**55**	**Filler Block**	C–9423–6
	56	**Rivet,** $\frac{1}{4}$"x$\frac{11}{16}$" Rd. Hd. I.	



Style "SL-21" Electric Switch Lock

Style "SL-21" Electric Switch Locks

Detail Parts

This plate is to be used for ordering detail parts of Style "SL-21" Locks in service. Orders for complete Locks of this type should refer to "SL-21A" Locks shown on Plate E-5710.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
183422	**2**	**Base**	C–9423–1
183424	**3**	**Case** (Without holes for attaching Lock Rod Support or Key Release) For use with ¾″ thick lever	C–9423–2
216402	**3a**	**Case** (Without holes for attaching Lock Rod Support or Key Release) For use with 1″ thick levers	C–9423–2
183529	**6**	**Cover** with Gasket Ref. 6a	C–9423–3
	6a	**Gasket,** ⅜″ Sq. Woven Flax Packing, 2′ 2½″ long.	
	8	**Magnet and Contact Spring Assembly** (For references and details refer to Ref. C, Plate E-5725)	C–9423–8
183428	**9**	**Foot Lever** (M. I. Pat. 183428B)	C–9423–5
183696	**12**	**Armature Bar Stop**	C–9423–6
64973	**13**	**Eye Bolt**	8034–64
183531	**14**	**Nut**	8082–193
213854	**15**	**Pin**	B–10202–1
209949	**16**	**Pin**	B–10207–1
183431	**17**	**Cover Plate** with ½″ Pipe Tap	9999–1048
183430	**18**	**Wire Inlet Plate** with 1½″ Pipe Tap	C–9423–6
235228	**18a**	**Wire Inlet Plate** with 1¼″ Pipe Tap	9999–1897
183525	**19**	**Plug**	9511–124
209305	**20**	**Pin**	B–10207–1
183522	**21**	**Pin**	8057–207
	22	**Bolt,** ⅜″-16x3¼″ Hex. Hd. S. with ⅜″ Pl. S. Lock Washer ($\frac{11}{64}$″x$\frac{7}{64}$″).	
183524	**23**	**Shaft**	12501–90
183526	**24**	**Eye Bolt**	8034–217

Style "SL-21" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
183527	**25**	**Eye Bolt**	8034–218
183523	**26**	**Collar**	8072–771
183814	**27**	**Collar**	8072–771
211689	**28**	**Coil Spring**	7770–508
183530	**29**	**Separator**	8072–700
214161	**30**	**Cover Plate**	9999–126
184180	**31**	**Pin**	8057–208
	32	**Pin** Ref. 32a with Washer Ref. 32b and $\frac{3}{16}$"x1$\frac{1}{8}$" S. Cotter (Tin Pl.)	8058–222
107544	**32a**	**Pin Only**	8058–222
7309	**32b**	**Washer**	7826–12
209420	**33**	**Pin**	B–10213–1
	34	**Lubricating Fitting,** $\frac{1}{8}$" P. T. Straight Hydraulic Type.	
	35	**Machine Screw,** No. 14-24x$\frac{7}{8}$" Flat Hd. Br. (N. P.)	
	36	**Tap Bolt,** $\frac{1}{4}$"-20x1$\frac{1}{8}$" Hex. Hd. S. with $\frac{1}{4}$" Pl. S. Lock Washer ($\frac{9}{64}$"x$\frac{5}{64}$") (Tin Pl.) and $\frac{1}{4}$" S. Plate Washer (Tin Pl.).	
	37	**Machine Screw,** No. 10-30x$\frac{7}{16}$" Flat Hd. S. (Tin Pl.) for attaching Ref. 30 to Base.	
	38	**Machine Screw,** $\frac{5}{16}$"-18x$\frac{7}{8}$" Flat Hd. S. (Cad. Pl.) for attaching Ref. 12 to Case.	
	39	**Tap Bolt,** $\frac{1}{4}$"-20x$\frac{7}{8}$" Hex. Hd. S. (Tin Pl.) with $\frac{1}{4}$" Pl. S. Lock Washer ($\frac{9}{64}$"x$\frac{5}{64}$") (Tin Pl.) For attaching Ref. 18 to Base.	
	40	**Tap Bolt,** $\frac{1}{4}$"-20x$\frac{5}{8}$" Hex. Hd. S. (Tin Pl.) with $\frac{1}{4}$" Pl. S. Lock Washer ($\frac{9}{64}$"x$\frac{5}{64}$") (Tin Pl.) For attaching Ref. 17 and 18a to Base.	
16267	**41**	**Hasp**	8299–26

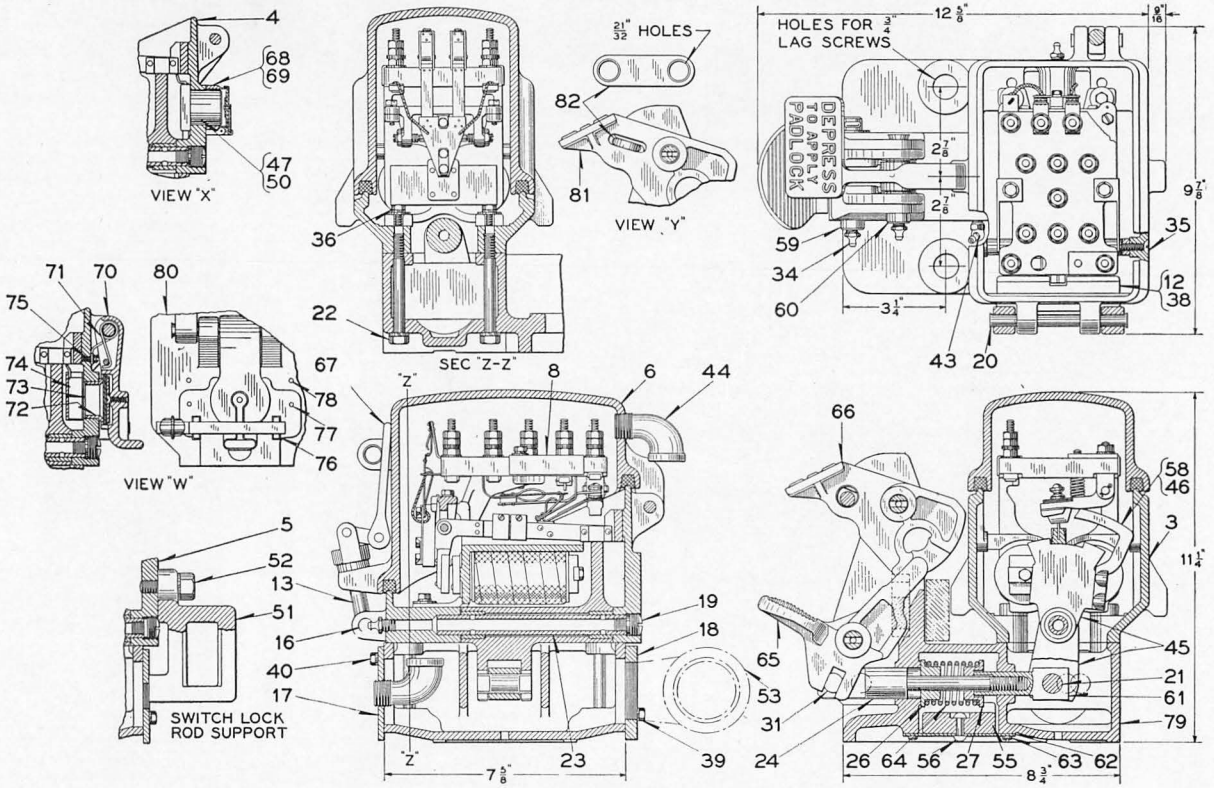
Style "SL-21" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	43	**Lubricating Fitting,** 1/8" P. T., 67 1/2° Hydraulic Type.	
70109	**44**	**Ventilator**	7318–57
183427	**45**	**Sector** (M. I. Pat. T-183425A) with Bushings Ref. 45a, Cam Ref. 46 and Screws Ref. 58 for Style "SL-21" Lock	C–9423–4
7225	**45a**	**Bushing** for Ref. 45	8350–94
183452	**46**	Cam for Style "SL-21" Lock	9121–158
	47	**Machine Screw,** No. 8-36x5/8" Flat Hd. Br. (N. P.) for attaching Ref. 46 to Sector (Used previous to 3-13-40) (Not shown).	
197545	**48**	**Locking Bar.** For use with two padlocks	9999–1210
234715	**48a**	**Locking Bar** with Chain. For use with one padlock, chain attaches to tie	9999–1703
	53	**Street Ell,** 1 1/2" Galv.	
232748	**54**	**Lever Latch** (with 1/2" hole) (M. I. Pat. 222896)	C–9423–10
232749	**54a**	**Lever Latch** (with 5/8" hole) (M. I. Pat. 222896)	C–9423–10
	54b	**Lever Latch** (with 1/2"x5/8" slotted hole) (M. I. Pat. 222896)	C–9423–10
	54c	**Lever Latch** (with 9/16" hole) (M. I. Pat. 222896)	C–9423–10
214162	**55**	**Filler Block**	C–9423–6
	56	**Rivet,** 1/4"x11/16" Rd. Hd. I.	
232750	**57**	**Lever Latch** with slotted hole (arranged for locking bar) (M. I. Pat. 222896) (See View "Z")	C–9423–10
	58	**Machine Screw,** No. 10-30x5/8" Flat Hd. S. (Tin Pl.) For attaching Ref. 46 to Sector (Used subsequent to 3-13-40).	



Style "SL-21A" Electric Switch Lock

Style "SL-21A" Electric Switch Locks

Detail Parts

Ordering references for complete Locks will be found on Plate E-5710.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
183424	**3**	**Case** (Without holes for attaching Lock Rod Support or Key Release) For use with ¾″ thick lever.....	C–9423–2
216402	**3a**	**Case** (Without holes for attaching Lock Rod Support or Key Release) For use with 1″ thick lever.....	C–9423–2
193293	**4**	**Case** (With hole for Key Release) (See View "X") For use with ¾″ thick lever.....	C–9423–2
220546	**4a**	**Case** (With hole for Key Release) (See View "X") For use with 1″ thick lever.....	C–9423–2
183423	**5**	**Case** (With holes for attaching Lock Rod Support Ref. 51) For use with ¾″ thick lever.....	C–9423–2
216541	**5a**	**Case** (With holes for attaching Lock Rod Support Ref. 51) For use with 1″ thick lever.....	C–9423–2
183529	**6**	**Cover** with Gasket Ref. 6a.....	C–9423–3
	6a	**Gasket,** ⅜″ Sq. Woven Flax Packing, 2′ 2½″ long.	
	8	**Magnet and Contact Spring Assembly** (For references and details refer to Ref. C, Plate E-5725)..	C–9423–8
183696	**12**	**Armature Bar Stop**.....	C–9423–6
64973	**13**	**Eye Bolt**.....	8034–64
209949	**16**	**Pin**.....	B–10207–1
183431	**17**	**Cover Plate** with ½″ Pipe Tap.....	9999–1048
183430	**18**	**Wire Inlet Plate** with 1½″ Pipe Tap.....	C–9423–6
235228	**18a**	**Wire Inlet Plate** with 1¼″ Pipe Tap.....	9999–1897
183525	**19**	**Plug**.....	9511–124
209305	**20**	**Pin**.....	B–10207–1
183522	**21**	**Pin**.....	8057–207
	22	**Bolt,** ⅜″-16x3¼″ Hex. Hd. S. with ⅜″ Pl. S. Lock Washer ($\frac{11}{64}$″x$\frac{7}{64}$″).	
183524	**23**	**Shaft**.....	12501–90

Style "SL-21A" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
183526	**24**	**Eye Bolt**	8034–217
183523	**26**	**Collar**	8072–771
183814	**27**	**Collar**	8072–771
184180	**31**	**Pin**	8057–208
	34	**Lubricating Fitting,** 1/8" P. T. Straight Hydraulic Type.	
	35	**Machine Screw,** No. 14-24x7/8" Flat Hd. Br. (N. P.).	
	36	**Tap Bolt,** 1/4"-20x1 1/8" Hex. Hd. S. with 1/4" Pl. S. Lock Washer (9/64"x5/64") (Tin Pl.) and 1/4" S. Plate Washer (Tin Pl.).	
	38	**Machine Screw,** 5/16"-18x7/8" Flat Hd. S. (Cad. Pl.) for attaching Ref. 12 to Case.	
	39	**Tap Bolt,** 1/4"-20x7/8" Hex. Hd. S. (Tin Pl.) with 1/4" Pl. S. Lock Washer (9/64"x5/64") (Tin Pl.) For attaching Ref. 18 to Base.	
	40	**Tap Bolt,** 1/4"-20x5/8" Hex. Hd. S. (Tin Pl.) with 1/4" Pl. S. Lock Washer (9/64"x5/64") (Tin Pl.) For attaching Refs. 17 and 18a to Base.	
	43	**Lubricating Fitting,** 1/8" P. T., 67 1/2° Hydraulic Type.	
70109	**44**	**Ventilator**	7318–57
183427	**45**	**Sector** (M. I. Pat. T-183425A) with Bushings Ref. 45a, Cam Ref. 46 and Screws Ref. 58 for Style "SL-21A" Lock	C–9423–4
7225	**45a**	**Bushing** for Ref. 45	8350–94
183452	**46**	**Cam** for Style "SL-21A" Lock	9121–158
	47	**Machine Screw,** No. 8-36x5/8" Flat Hd. Br. (N. P.) for attaching Lock Ref. 50 to Case.	
193360	**49**	**Key Release Shield.** Used on "SL-20" and "SL-21" Locks previous to 2-29-40 (Not shown) see Ref. 68 for later design	C–9423–4
94859	**50**	**Lock Complete**	C–6967–11

Style "SL-21A" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
16236	**51**	**Lock Rod Support**	C–6967–4
	52	**Tap Bolt,** ½″x1¼″ Hex. Hd. S.	
	53	**Street Ell,** 1½″ Galv.	
214162	**55**	**Filler Block**	C–9423–6
	56	**Rivet,** ¼″x$\frac{11}{16}$″ Rd. Hd. I.	
	58	**Machine Screw,** No. 10-30x⅝″ Flat Hd. S. (Tin Pl.) For attaching Ref. 46 to Sector.	
	59	**Pin** Ref. 59a with Washer Ref. 59b and $\frac{3}{16}$″x1⅛″ S. Cotter (Tin Pl.)	8057–218
234735	**59a**	**Pin Only**	8057–218
136563	**59b**	**Washer**	7826–249
234734	**60**	**Pin**	8057–217
235014	**61**	**Eye Bolt**	8034–240
234849	**62**	**Cover Plate**	9999–1893
	63	**Machine Screw,** No. 10-30x$\frac{7}{16}$″ Fil. Hd. S. (Tin Pl.).	
54722	**64**	**Coil Spring**	7770–288
231771	**65**	**Foot Lever**	C–9423–12
231770	**66**	**Lever Latch** (with $\frac{21}{32}$″ hole)	C–9423–11
236579	**67**	**Hasp Complete**	8299–159
216833	**68**	**Key Release Cover Complete** (Two No. 10-30 taps must be added in case when substituting Ref. 68 for Ref. 49)	12779–3
	69	**Machine Screw,** No. 10-30x⅝″ Fil. Hd. Br. (N. P.) with No. 10 Ph. Bz. Lock Washer (N. P.).	
239663	**70**	**Key Release Cover Complete** (Inc. 1-70a, 1-70b, 1-70c, 1-70d, and 1-70e)	C–9423–14
239554	**70a**	**Key Release Cover Only**	C–9423–14

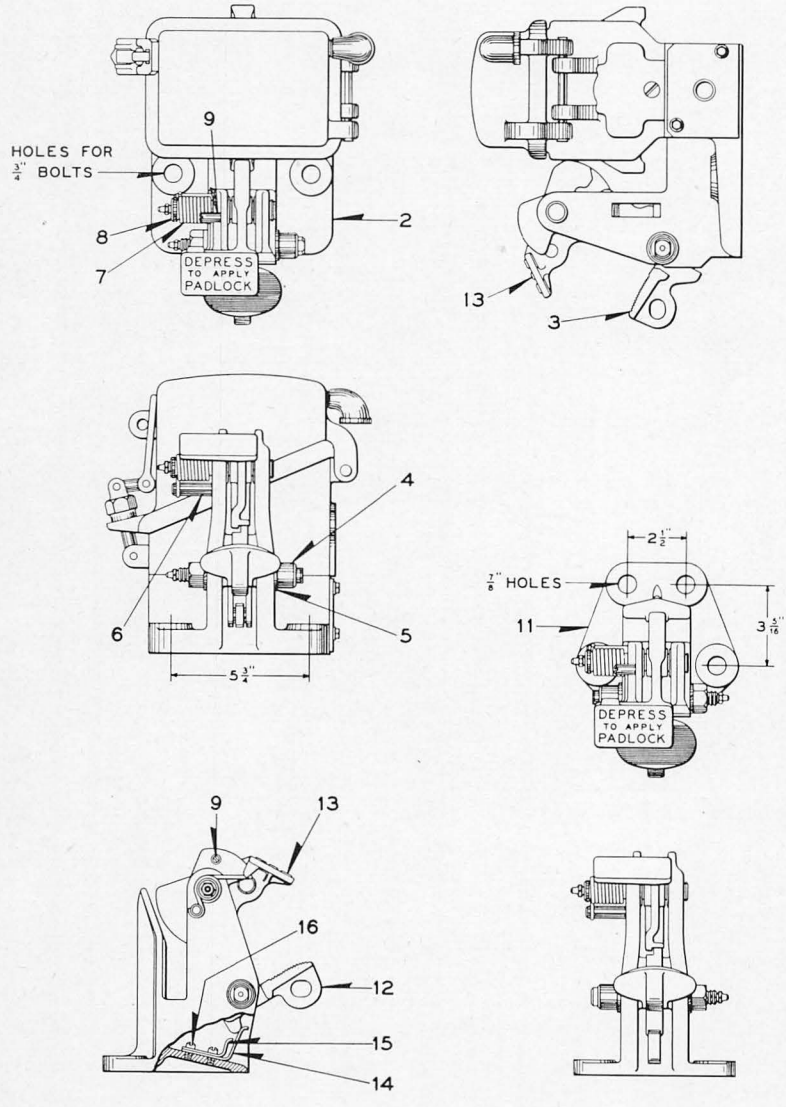
Style "SL-21A" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
239662	**70b**	**Gasket Plate**	7826–328
239660	**70c**	**Stud** for Spring	8114–1024
239659	**70d**	**Gasket**	8078–1739
	70e	**Machine Screw,** No. 10-30x¾″ Flat Hd. Br.	
239661	**71**	**Cover Spring**	7770–608
239656	**72**	**Bushing**	8072–937
	73	**Key Guide Plate**	9999–
	74	**Key Release Mechanism Assembly** (When ordering Sealed Key Release furnish us with samples of Seals to be used and a new key)	10914–
	75	**Machine Screw,** No. 10-30x⅜″ Fil. Hd. S. (Tin Pl.) with Washer Ref. 75a.	
73493	**75a**	**Washer**	7826–78
239657	**76**	**Staple**	8191–175
	77	**Machine Screw,** No. 10-30x⅝″ Fil. Hd. S. (Tin Pl.) with No. 10 Pl. S. Lock Washer (1/16″x3/64″) (Tin. Pl.).	
	78	**Machine Screw,** No. 10-30x⅜″ Fil. Hd. S. (Tin Pl.) with No. 10 Pl. S. Lock Washer (1/16″x3/64″) (Tin Pl.).	
235015	**79**	**Base**	C–9423–13
239041	**80**	**Case** (With holes for sealed key release) (See View "W") For use with ¾″ thick lever	C–9423–2
240729	**80a**	**Case** (With holes for sealed key release) (See View "W") For use with 1″ thick lever	C–9423–2
	81	**Lever Latch** with slotted hole (arranged for locking bar) (See View "Y")	C–9423–
	82	**Locking Bar.** For use with two padlocks	9999–
	82a	**Locking Bar with Chain.** For use with one padlock. Chain attaches to tie	9999–



Style "SL-21A" Electric Switch Lock and Tandem Latch Stand

Style "SL-21A" Electric Switch Lock and Tandem Latch Stand

This plate illustrates only those detail parts which differ from details of the "SL-21A" Switch Locks shown on Plate E-5720-3.

Complete "SL-21A" Switch Locks arranged for use with Tandem Latch Stand have the same coil and contact characteristics as the "SL-21A" Locks shown on Plate E-5710. Orders for a complete "SL-21A" Switch Lock arranged for use with Tandem Latch Stand should refer to Plate E-5710 giving the reference number (Refs. D to Dg) of Lock desired and stating "arranged for use with Tandem Latch Stand."

For applications to Switch Mechanisms refer to Plate E-5701.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

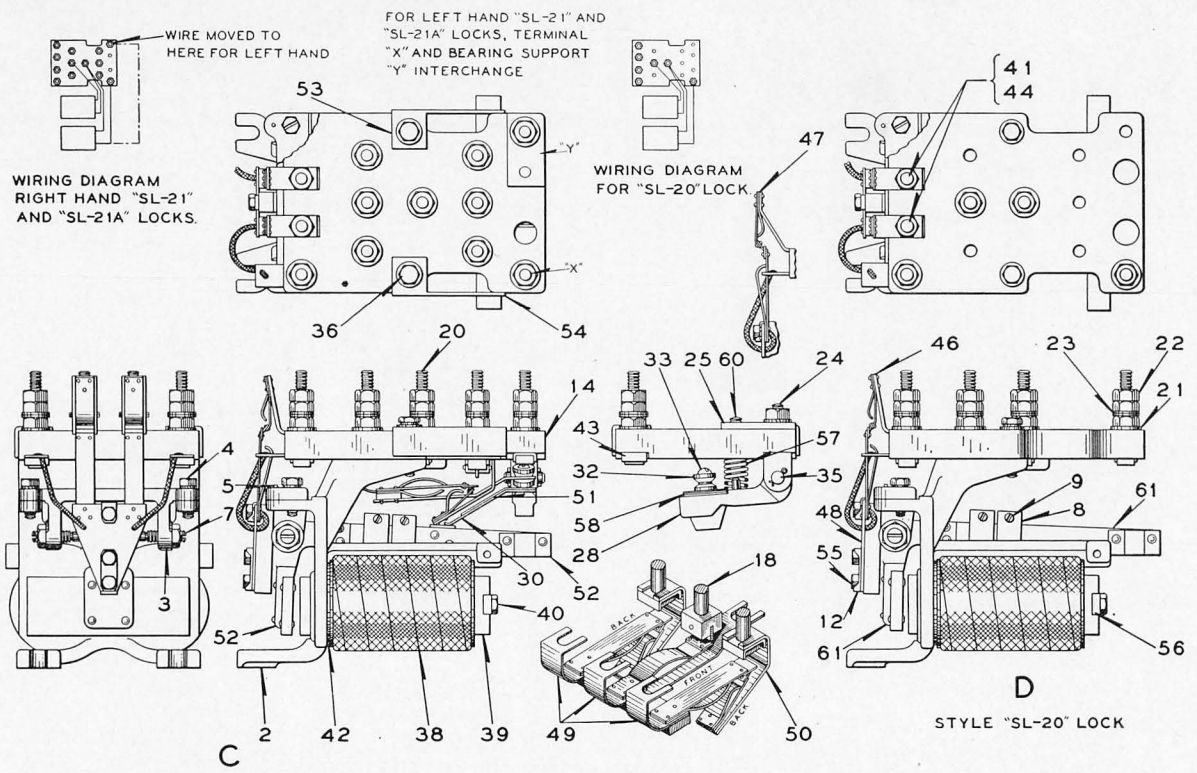
Piece	Ref.	Description	Drawing Reference
262745	**2**	**Base** for use with $\frac{3}{4}$" thick lever	C–9423–13
	2a	**Base** for use with 1" thick lever	C–9423–13
262789	**3**	**Foot Lever**	C–9423–12
	4	**Pin** Ref. 4a with $\frac{5}{8}$" Plain S. Lock Washer (C.N. 47771), $\frac{1}{8}$" P.T. Straight Lubricating Fitting (C.N. 39137), Washer Ref. 5 and $\frac{5}{8}$" Hex. Nut (C.N. 48020).	
262680	**4a**	**Pin Only**	8057–222
259851	**5**	**Washer**	8332–37
262682	**6**	**Torsion Spring Anchor Pin**	8115–290
262683	**7**	**Torsion Spring**	8124–281
	8	**Pin** Ref. 8a with $\frac{1}{8}$" P.T. Straight Lubricating Fitting (C.N. 39137).	
262681	**8a**	**Pin Only**	8057–223
262684	**9**	**Stop Pin**	8114–1087
262714	**10**	**Tandem Latch Stand Complete.** For use with $\frac{3}{4}$" thick lever	C–16880–1
	10a	**Tandem Latch Stand Complete.** For use with 1" thick lever	C–16880–1
262686	**11**	**Latch Stand Only** for Ref. 10	C–16881–1
	11a	**Latch Stand Only** for Ref. 10a	C–16881–1
262687	**12**	**Foot Lever**	C–16881–2
231770	**13**	**Lever Latch** (With $\frac{21}{32}$" Hole)	C–9423–11
262712	**14**	**Foot Lever Spring**	8735–1078

Style "SL-21A" Electric Switch Lock and Tandem Latch Stand

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
272713	15	**Foot Lever Spring Stop**	8735–1077
	16	**Machine Screw,** ¼″-20x½″ Fil. Hd. S. (C.N. 52200) (Tin Pl.).	
282473	17	**Material Necessary for Converting the Standard Style "SL-21A" Lock to Suit the Tandem Latch Arrangement** (Includes drilling template)	C–16831–6



Magnet and Contact Spring Assemblies for "SL-20", "SL-21" and "SL-21A" Switch Locks

Styles "SL-20", "SL-21" and "SL-21A" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

Any of the assemblies tabulated below may be had as follows:
1. One of the armature contacts may be a front contact.
2. All three latch contacts may be front contacts.
If any of the above alternatives are desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Magnet and Contact Spring Assembly with 2 Back Armature Contacts and 1 Front and 2 Back Latch operated Contacts for Styles "SL-21" and "SL-21A" Electric Switch Locks.

Piece	Ref.	Coils (Ohms per pair)	Drawing Reference
243097	**C**	50	C–9423–8
245122	**Ca**	75	C–9423–8
243619	**Cb**	120	C–9423–8
	Cc	180	C–9423–8
197745	**Cd**	280	C–9423–8
183686	**Ce**	440	C–9423–8
198370	**Cf**	670	C–9423–8
210508	**Cg**	1000	C–9423–8

Magnet and Contact Spring Assembly with 2 Back Armature Contacts for Style "SL-20" Electric Switch Locks.

Piece	Ref.	Coils (Ohms per pair)	Drawing Reference
	D	50	C–9423–8
	Da	75	C–9423–8
	Db	120	C–9423–8
	Dc	180	C–9423–8
209063	**Dd**	280	C–9423–8
183687	**De**	440	C–9423–8
196086	**Df**	670	C–9423–8
	Dg	1000	C–9423–8

Styles "SL-20", "SL-21" and "SL-21A" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
183442	**2**	**Magnet Bracket with Cores**	C–9423–7
183437	**3**	**Armature Bracket**	8303–122
19008	**4**	**Screw** with No. 10 Pl. S. Lock Washer ($\frac{1}{16}$″x$\frac{3}{64}$″) (Tin Pl.)	8098–289
89942	**5**	**Pin**	8097–568
183454	**7**	**Trunnion** with Hex. Nut Ref. 7a	12471–5
29577	**7a**	**Hex. Nut** for Ref. 7	8109–205
184144	**8**	**Counterweight**	9672–215
	9	**Machine Screw,** No. 6-40x$\frac{3}{8}$″ Fil. Hd. Br. (N. P.).	
74798	**12**	**Nut Lock**	8486–155
183439	**14**	**Terminal Board**	9968–1112
	18	**Front Contact Post** with Silver Tip, Nuts and Washers (Inc. 1-18a, 1-21, 3-22 and 2-23)	12451–
183453	**18a**	**Front Contact Post** with Silver Tip	8094–2184
	20	**Terminal Post** with Nuts and Washers (Inc. 1-20a, 1-21, 3-22, 2-23 and 1-43)	12451–
115706	**20a**	**Terminal Post only,** for Ref. 20	8094–1192
29104	**21**	**Washer**	7828–138
31670	**22**	**Nut**	8109–218
29102	**23**	**Washer**	7828–139
	24	**Screw Jaw** with Nut Ref. 22 and $\frac{1}{4}$″ Pl. S. Lock Washer ($\frac{9}{64}$″x$\frac{5}{64}$″) (Tin Pl.)	8025–107
183449	**24a**	**Screw Jaw Only**	8025–107
183562	**25**	**Plate** with No. 14-24 tapped hole	11893–686
183445	**28**	**Operating Arm Complete**	8192–387
183450	**30**	**Armature Force Down Spring**	8735–778

Styles "SL-20", "SL-21" and "SL-21A" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
54718	**32**	**Bushing**	8095–489
	33	**Machine Screw,** No. 8-36x¾″ Rd. Hd. Br. (N. P.).	
167878	**35**	**Pin** with two $\frac{1}{16}$″x½″ Brass Cotters (N. P.)	8063–180
	36	**Tap Bolt,** ¼″-20x1″ Hex. Hd. S. (Tin Pl.) with ¼″ Pl. S. Lock Washer ($\frac{9}{64}$″x$\frac{5}{64}$″) (Tin Pl.) and Washer Ref. 36a.	
73099	**36a**	**Washer**	7826–66
197744	**38**	**Coil,** 140-Ohms	8133–429
183228	**38a**	**Coil,** 220-Ohms	8133–429
184065	**38b**	**Coil,** 335-Ohms	8133–429
209322	**38c**	**Coil,** 500-Ohms	8133–429
237888	**38d**	**Coil,** 90-Ohms	8133–429
243096	**38e**	**Coil,** 25-Ohms	8133–429
243618	**38f**	**Coil,** 60-Ohms	8133–429
245121	**38g**	**Coil,** 37.5 Ohms	8133–429
183441	**39**	**Back Strap**	8162–250
	40	**Cap Screw,** ¼″-28x¾″ Hex. Hd. S. (Tin Pl.).	
36073	**41**	**Washer** for Ref. 44 (Located between bottom Nut and Armature Contact)	7828–161
168826	**42**	**Washer** ($\frac{1}{16}$″ Thick)	8078–1499
168824	**42a**	**Washer** (⅛″ Thick)	8078–1499
188259	**43**	**Lock Washer**	8486–310
	44	**Terminal Post** with Nuts and Washers (Inc. 1-20a, 3-22, 2-23, 1-41 and 1-43)	12451–

Styles "SL-20", "SL-21" and "SL-21A" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
220307	46	**Back Contact Complete** (Armature Contact)	8094–2423
220305	47	**Front Contact Complete** (Armature Contact)	8094–2422
220323	48	**Contact Spring Complete** for Armature Contacts (2 Back Contacts)	8385–2691
220324	48a	**Contact Spring Complete** for Armature Contacts (1 Front and 1 Back Contacts)	8385–2691
222828	48b	**Contact Spring Complete** for Armature Contacts (2 Front Contacts)	8385–2691
220054	49	**Contact Spring Complete** for Latch Operated Contacts (1 Front and 2 Back Contacts)	8385–2685
232130	49a	**Contact Spring Complete** for Latch Operated Contacts (2 Front and 1 Back Contacts)	8385–2735
220056	49b	**Contact Spring Complete** for Latch Operated Contacts (3 Front Contacts)	8385–2687
232747	49c	**Contact Spring Complete** for Latch Operated Contacts (1 Front Contact)	8385–2742
220047	50	**Back Post Complete**	8094–2421
236307	51	**Reinforcing Spring**	8735–1019
231442	52	**Armature and Bar Complete** for "SL-21" and "SL-21A" Locks	8130–325
231804	53	**R. H. Guard**	12435–25
231805	54	**L. H. Guard**	12435–25
222242	55	**Screw**	8098–51
54713	56	**Bolt Lock**	8486–267
231944	57	**Spring** ($\frac{3}{8}$" inside diam., $1\frac{49}{64}$" long) Used subsequent to 3-16-42)	7770–596
183448	57a	**Spring** ($\frac{13}{64}$" inside diam., $1\frac{3}{16}$" long) Used previous to 3-16-42)	7770–432

Styles "SL-20", "SL-21" and "SL-21A" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
231920	**58**	**Reinforcing Piece**	12538–257
	59	**Machine Screw,** No. 6-40x¼" Flat Hd. S. (Tin Pl.) For attaching Refs. 30, 51 and 58 to Operating Arm. (Not shown).	
	60	**Machine Screw,** No. 14-24x¼" Fil. Hd. S. (Tin Pl.) (Used with Spring Ref. 57).	
183455	**60a**	**Screw** (¼"-32 threads) (Used with Spring Ref. 57a)	8098–1101
537	**60b**	**Nut** for Ref. 60a	8109–1
183443	**61**	**Armature and Bar Complete** for "SL-20" Locks	8130–325

Union Style "SL-25" and Style "SL-26" Electric Switch Locks

The Styles SL-25 and SL-26 locks are low-type electric locks developed primarily to meet the demand for a suitable device for electrically locking levers located between the rails at the middle of hand-operated crossovers, where clearance requirements limit the height of the lock to 7 inches (including mounting plate). These locks, which are adaptable also to Union Style T-20 and S-20 mechanisms and to most low-type switch stands, incorporate indicators and other new features and improvements which offer numerous design and functional advantages. They are exceptionally easy to operate and the electrical unlock may be automatically, semi-automatically, or manually controlled.

Both the Styles SL-25 and SL-26 locks are designed with basic functional elements similar to those developed for the well-known Style SL-21A lock, and their action is simple and positive. The principle of operation is that of using a pedal-operated lever latch which will prevent operation of the hand-throw lever unless an electrical unlock is obtained. This latch mechanism is designed so that removal of the padlock from the latch permits the pedal to move automatically to an intermediate position, thereby actuating the cam-operated contacts provided for use in signal and time-element control circuits. However, further depression of the pedal, which would allow operation of the hand-throw lever, is prevented unless the lock magnet is energized to release the latch. Contacts to check the position of the magnet armature are also provided.

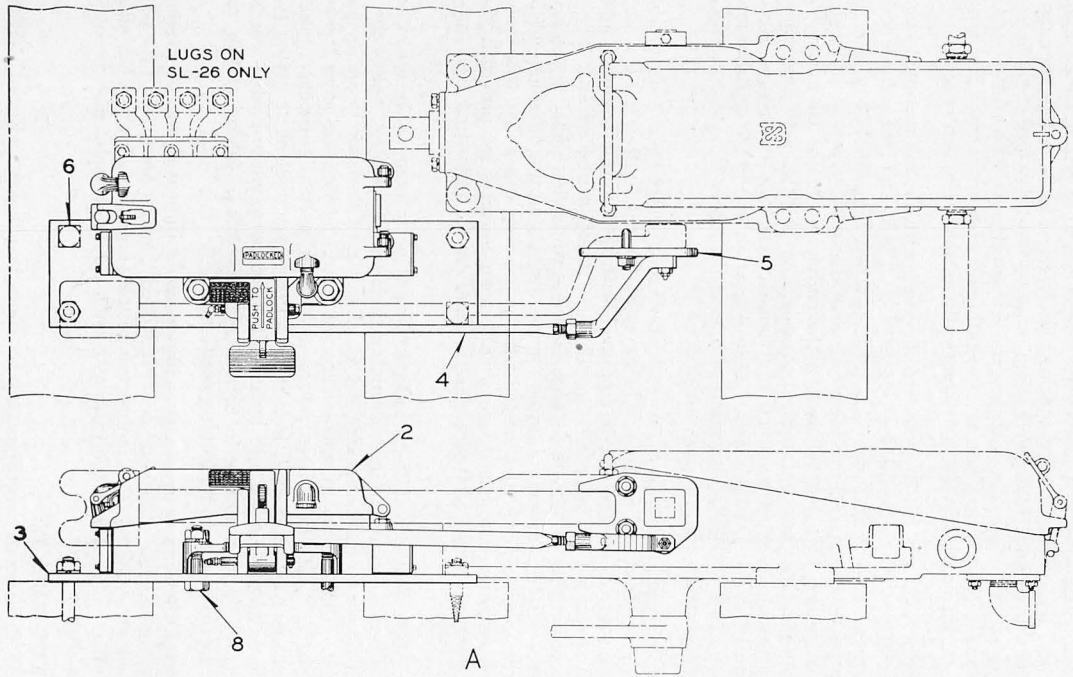
The difference between the Styles SL-25 and SL-26 locks relates solely to their cam-operated contacts and associated features. The Style SL-25 lock is designed for use with line-wire controlled signal systems and is equipped with two normally-closed and one normally-open cam-operated contacts suitable for the control of line circuits. The Style SL-26 lock is especially designed for use with track-circuit controlled signal systems and is equipped with cam-operated contacts suitable for the direct shunting of track circuits in steam-road territory so as to eliminate the need for any line wires other than those required for remote control of the lock magnet. Six normally-open contacts are provided, four of which are conveniently arranged for track shunting and are factory wired to clamp-type terminals.

One of the principal features of these locks is a positive mechanical interlock which prevents the cam-operated contacts from assuming their normal position unless the latch is in its padlocked position and the locking dog on the magnet armature is in its locking position. This assures that the signal controls are not restored to normal after the switch has been used until all parts have been returned to their normal padlocked positions. However, the mechanism is so designed that the trainman may padlock the latch to hold the hand-throw lever secure against use by unauthorized persons even when the signal controls are prevented from returning to normal as the result of failure of the magnet armature locking dog to return to its locking position.

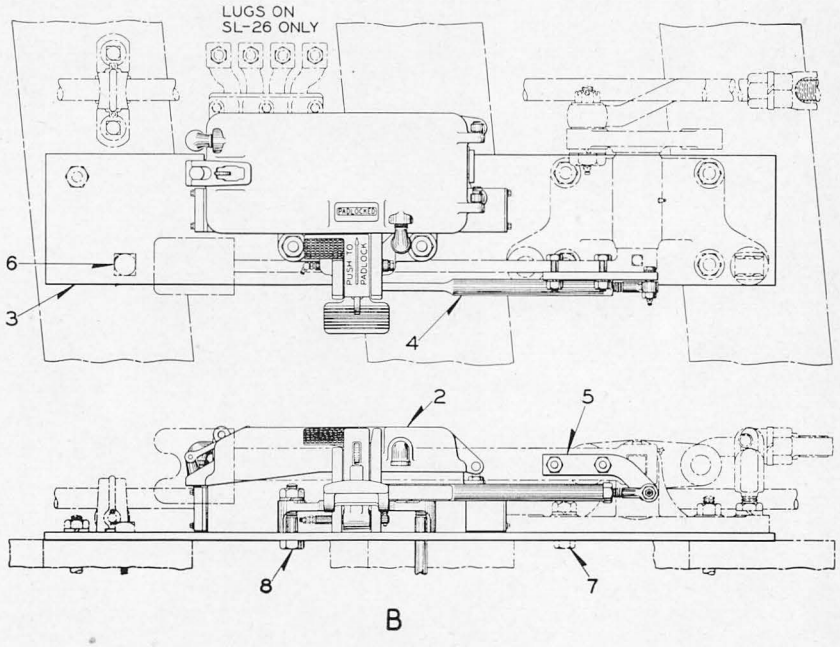
Another important feature is a mechanically-operated indicator which successively displays the words "padlocked", "locked", and "unlocked", in accordance with the position of the latch and lock mechanisms. This indicator is visible through a glass window adjacent to the latch and effectively informs the trainmen when the latch pedal may be operated to release the hand-throw lever.

EMERGENCY KEY RELEASE

Emergency Key Releases of two types may be applied as shown in Plates E-5740 and E-5745. View "W" shows an emergency release actuated by a Yale-type key which is usually kept in the office of a Supervisory Officer in the vicinity of the switch lock. View "X" shows an emergency release operated by a standard switch key which can only be applied after a standard car seal has been broken.



Application of Styles "SL-25" and "SL-26" Electric Switch Locks to "T-20" Switch Mechanism



Application of Styles "SL-25" and "SL-26" Electric Switch Locks to Ground Lever Stand

Application of Styles "SL-25" and "SL-26" Electric Switch Locks to Ground Levers And Low Switch Mechanisms

Applications of Lock for tandem operation will be found on Plate E-5731.

Orders for Locks to be applied to any of our switch mechanisms or ground levers should be accompanied by dimensioned print of layout or refer to application drawing so proper fittings can be furnished.

Orders for Locks to be applied to ground levers or mechanisms other than U. S. & S. Co. manufacture should be accompanied with dimensioned print of layout and print of switch stand showing:

(1) Distance from top of the tie to center of lever hub.

(2) Distance from edge of base of movement to center of hand-throw lever.

(3) Section of lever.

(4) Other lever dimensions:

(a) From center of Lever hub to counterweight.

(b) Distance between centerline of hub and end of hand-throw lever offset.

(c) Offset of hand-throw lever. If there is no offset in existing lever orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

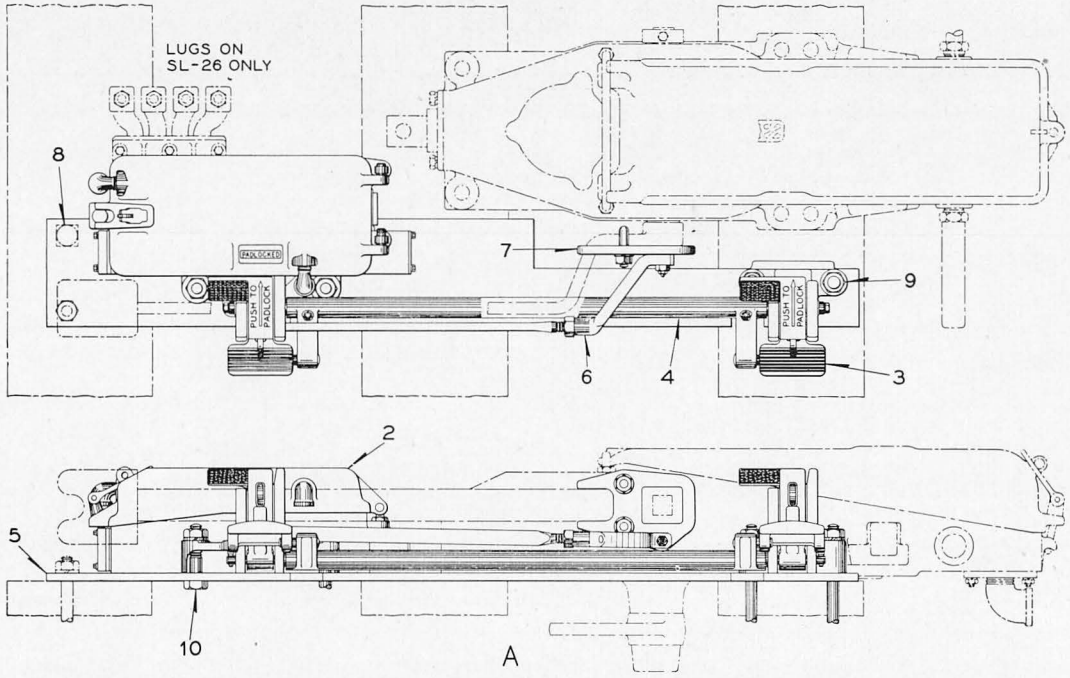
Piece	Ref.	Description	Drawing Reference
	A	**Style "SL-25" Electric Switch Lock** with Lever Lock Rod, Support, Base Plate and Bolts for applying to "T-20" or "T-21" hand operated Switch Mechanism (Inc. 1-2, 1-3, 1-4, 1-5 and necessary Lag Screws and Bolts Refs. 6, 7 and 8) (Orders should specify Lock desired by referring to Plate E-5735)	C–16698–
	Aa	**Style "SL-26" Electric Switch Lock** with Lever Lock Rod, Support, Base Plate and Bolts for applying to "T-20" or "T-21" hand operated Switch Mechanism (Inc. 1-2a, 1-3, 1-4, 1-5 and necessary Lag Screws and Bolts Refs. 6, 7 and 8) (Orders should specify Lock desired by referring to Plate E-5735)	C–16698–
	B	**Style "SL-25" Electric Switch Lock** with Lever Lock Rod, Support, Base Plate and Bolts for applying to Ground Lever shown on Plate C-42 (Inc. 1-2, 1-3, 1-4, 1-5 and necessary Lag Screws and Bolts Refs. 6, 7 and 8) (Orders should specify Lock desired by referring to Plate E-5735)	C–16911–
	Ba	**Style "SL-26" Electric Switch Lock** with Lever Lock Rod, Support, Base Plate and Bolts for applying to Ground Lever shown on Plate C-42 (Inc. 1-2a, 1-3, 1-4, 1-5 and necessary Lag Screws and Bolts Refs. 6, 7 and 8) (Orders should specify Lock desired by referring to Plate E-5735)	C–16911–

Application of Styles "SL-25" and "SL-26" Electric Switch Locks to Ground Levers And Low Switch Mechanisms

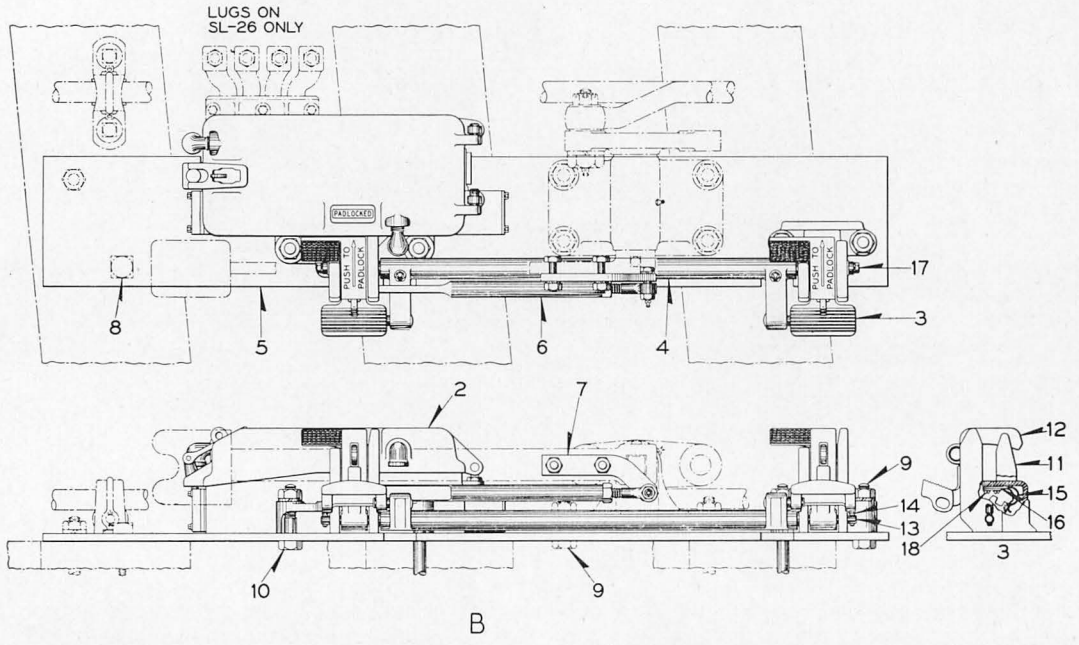
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	2	**Style "SL-25" Electric Switch Lock** (When ordering refer to Plate E-5735)	C–16879–
	2a	**Style "SL-26" Electric Switch Lock** (When ordering refer to Plate E-5735)	C–16879–
	3*	**Base Plate**	B–9375–
	4*	**Lever Lock Rod**	C–6967–
	5*	**Lever Lock Rod Support Complete**	C–6967–
	6	**Lag Screw** (Orders should specify size desired).	
	7	**Bolt,** ¾″ with ¾″ Plain S. Lock Washer and Nut (Orders should specify length of bolt and type of head desired).	
	8	**Bolt,** ⅞″ with ⅞″ Plain S. Lock Washer and Nut (Orders should specify length of bolt and type of head desired).	
		*Orders for repair parts should refer to application drawing and type of ground lever stand.	



Application of Styles "SL-25" and "SL-26" Electric Switch Locks and Tandem Latch Stand to "T-20" Switch Mechanism



Application of Styles "SL-25" and "SL-26" Electric Switch Locks and Tandem Latch Stand to Ground Lever Stand

Application of Styles "SL-25" and "SL-26" Electric Switch Locks and Tandem Latch Stands to Ground Levers and Low Switch Mechanisms

Application of "SL-25" and "SL-26" Locks other than tandem operation will be found on Plate E-5730.

The tandem arrangement may be applied to any Ground Lever or low Switch Mechanism. Orders for Lock and Tandem Latch to be applied to any of our switch mechanisms or ground levers should be accompanied by dimensioned print of layout or refer to application drawing so proper fittings can be furnished. Orders for Lock and Tandem Latch to be applied to Ground Levers or Mechanisms other than U. S. & S. Co. manufacture should be accompanied with dimensioned print of layout and print of switch stand showing:

(1) Distance from top of the tie to center of lever hub.

(2) Distance from edge of base of movement to center of hand-throw lever.

(3) Section of lever.

(4) Other lever dimensions:

(a) From center of lever hub to counterweight.

(b) Distance between centerline of hub and end of hand-throw lever offset.

(c) Offset of hand-throw lever. If there is no offset in existing lever orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "SL-25" Electric Switch Lock and Tandem Latch Stand** with Lever Lock Rod, Support, Base Plate, Rocker Shaft and Bolts for applying to "T-20" or "T-21" hand operated Switch Mechanism (Inc. 1-2, 1-3 or 3a, 1-4, 1-5, 1-6, 1-7 and necessary Lag Screws and Bolts Refs. 8, 9 and 10) (Orders should specify Lock desired by referring to Plate E-5735)	C–16698–
	Aa	**Style "SL-26" Electric Switch Lock and Tandem Latch Stand** with Lever Lock Rod, Support, Base Plate, Rocker Shaft and Bolts for applying to "T-20" or "T-21" hand operated Switch Mechanism (Inc. 1-2a, 1-3 or 3a, 1-4, 1-5, 1-6, 1-7 and necessary Lag Screws and Bolts Refs. 8, 9 and 10) (Orders should specify Lock desired by referring to Plate E-5735)	C–16698–
	B	**Style "SL-25" Electric Switch Lock** with Lever Lock Rod, Support, Base Plate, Rocker Shaft and Bolts for applying to Ground Lever shown on Plate C-42 (Inc. 1-2, 1-3 or 3a, 1-4, 1-5, 1-6, 1-7 and necessary Lag Screws and Bolts Refs. 8, 9 and 10) (Orders should specify Lock desired by referring to Plate E-5735)	C–16911–

Application of Styles "SL-25" and "SL-26" Electric Switch Locks and Tandem Latch Stands to Ground Levers and Low Switch Mechanisms

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

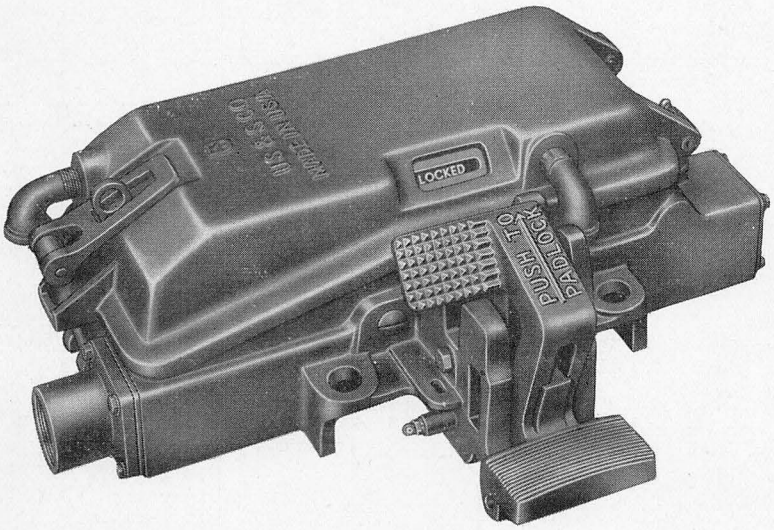
Piece	Ref.	Description	Drawing Reference
	Ba	**Style "SL-26" Electric Switch Lock** with Lever Lock Rod, Support, Base Plate, Rocker Shaft and Bolts for applying to Ground Lever shown on Plate C-42. (Inc. 1-2a, 1-3 or 3a, 1-4, 1-5, 1-6, 1-7 and necessary Lag Screws and Bolts Refs. 8, 9 and 10) (Orders should specify Lock desired by referring to Plate E-5735)	C–16911–
	2	**Style "SL-25" Electric Switch Lock** (When ordering refer to Plate E-5735)	C–16879–
	2a	**Style "SL-26" Electric Switch Lock** (When ordering refer to Plate E-5735)	C–16879–
273505	**3**	**Tandem Latch Stand Complete** for ¾″ thick lever.	C–16880–2
278945	**3a**	**Tandem Latch Stand Complete** for 1″ thick lever. .	C–16880–2
	4*	**Rocker Shaft Complete**	C–16881–
	5*	**Base Plate**	B–9375–
	6*	**Lever Lock Rod**	C–6967–
	7*	**Lever Lock Rod Support Complete**	C–6967–
	8	**Lag Screw** (Orders should specify size desired).	
	9	¾″ **Bolt,** with ¾″ Plain S. Lock Washer and Nut (Orders should specify length of bolt and type of head desired).	
	10	⅞″ **Bolt,** with ⅞″ Plain S. Lock Washer and Nut (Orders should specify length of bolt and type of head desired).	
273503	**11**	**Latch Stand** for ¾″ thick lever	C–16881–6
278907	**11a**	**Latch Stand** for 1″ thick lever	C–16881–6
274017	**12**	**Latch**	C–16878–18
260348	**13**	**Latch Pin**	8057–221
260349	**14**	**Latch Pin Lock**	8034–247
273714	**15**	**Spring**	8735–1108

Application of Styles "SL-25" and "SL-26" Electric Switch Locks and Tandem Latch Stands to Ground Levers and Low Switch Mechanisms

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
273717	**16**	**Spring Hold Down Plate**.....	8735–1110
	17	**Tap Bolt,** $\frac{3}{8}$"-16x1" Hex. Hd. S. (C.N. 46426) (Cad. Pl.) with $\frac{3}{8}$" Plain S. Lock Washer (C.N. 47779) (Cad. Pl.).	
	18	**Machine Screw,** No. 10-32x$\frac{9}{16}$" Rd. Hd. S. (C.N. 525046) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) (Tin Pl.).	
		*Orders for repair parts should refer to application drawing and type of ground lever stand.	



Styles "SL-25" and "SL-26" Electric Switch Locks

Styles "SL-25" and "SL-26" Electric Switch Locks

For detail parts refer to Plate E-5740 for "SL-25" Lock and to Plate E-5745 for "SL-26" Lock.

For application of Lock to Switch Mechanisms refer to Plate E-5730.

For application of Lock and Tandem Latch to Switch Mechanisms refer to Plate E-5731.

For Magnet Assembly and Contact Spring Board details refer to Plate E-5750. Standard assemblies are tabulated below, if any of the following alternatives are desired, orders should so state.

1. **Without armature contacts.**
2. **Case arranged for use with 1″ thick lever.**
3. **SL-25 Lock with 2 normally open and 1 normally closed cam operated contacts.**
4. **SL-26 Lock with 4 normally open and 2 reversible cam operated contacts.**

*5. **With Key Release per View "X" or "W" of Plate E-5740 or E-5745.**

***When ordering Key Release furnish us with sample of new key and if Key Release is to be sealed also furnish sample of seal.**

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "SL-25" Electric Switch Lock Ref..... having Coils.....-Ohms per pair, Case for use with ¾″ thick Lever and Wire Outlet or Cover Plate Ref..... (See Refs. 50, 51, 56, 60 and 81 of Plate E-5740)

Piece	Ref.	Magnet Assembly		†Armature Contacts	Cam Operated Contacts	Drawing Reference
		Ref. Plate E-5750	Coils (Ohms per Pair)			
	A	**A**	50	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–
	Aa	**Aa**	75	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–
	Ab	**Ab**	120	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–
	Ac	**Ac**	180	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–
	Ad	**Ad**	280	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–
	Ae	**Ae**	440	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–
	Af	**Af**	670	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–
	Ag	**Ag**	1000	1B 1FB	2 Norm. Closed and 1 Norm. Open	C–16879–

Styles "SL-25" and "SL-26" Electric Switch Locks

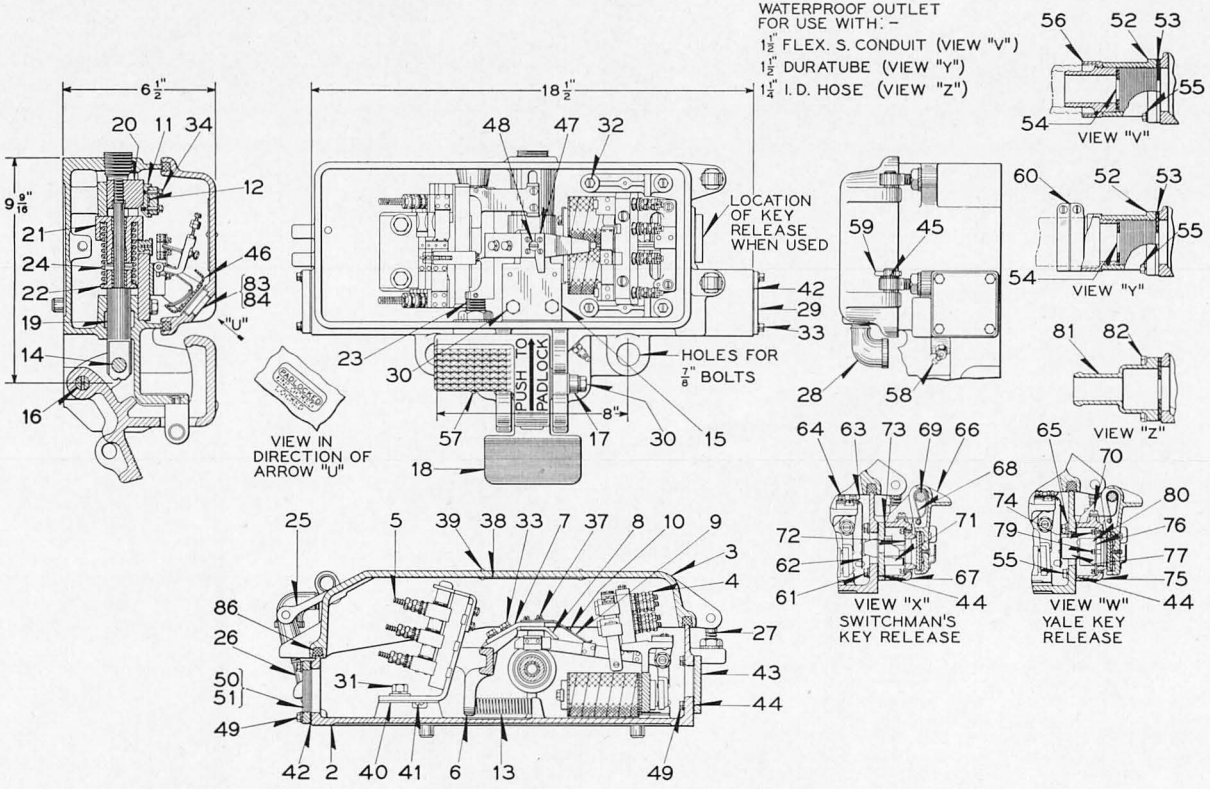
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "SL-26" Electric Switch Lock Ref..... having Coils.....-Ohms per pair, Case for use with ¾" thick Lever and Wire Outlet or Cover Plate Ref..... (See Refs. 50, 51, 56, 60 and 81 of Plate E-5745)

Piece	Ref.	Magnet Assembly		†Armature Contacts	Cam Operated Contacts	Drawing Reference
		Ref. Plate E-5750	Coils (Ohms per Pair)			
	B	**A**	50	1B 1FB	6 Norm. Open	C–16879–
	Ba	**Aa**	75	1B 1FB	6 Norm. Open	C–16879–
	Bb	**Ab**	120	1B 1FB	6 Norm. Open	C–16879–
	Bc	**Ac**	180	1B 1FB	6 Norm. Open	C–16879–
	Bd	**Ad**	280	1B 1FB	6 Norm. Open	C–16879–
	Be	**Ae**	440	1B 1FB	6 Norm. Open	C–16879–
	Bf	**Af**	670	1B 1FB	6 Norm. Open	C–16879–
	Bg	**Ag**	1000	1B 1FB	6 Norm. Open	C–16879–

†B = independent back contact.
FB = dependent front and back contact.



Style "SL-25" Electric Switch Locks

Detail Parts

Style "SL-25" Electric Switch Locks

Detail Parts

Ordering references for complete Locks will be found on Plate E-5735.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
260453	**2**	**Housing Complete.** Arranged for ¾" thick Lever....	D–2583–3
273253	**2a**	**Housing Complete.** Arranged for 1" thick Lever....	D–2583–3
260451	**3**	**Cover Complete**.....	D–2583–2
	4	**Magnet Assembly Complete.** For details and assemblies refer to Plate E-5750.....	C–16878–1
	5	**Cam Operated Contact Spring Board Complete.** For details and assemblies refer to Plate E-5750.....	C–16878–15
260265	**6**	**Contact Operating Lever**.....	C–16878–16
260335	**7**	**Depressor Bracket**.....	10914–1872
260336	**8**	**Depressor**.....	10914–1873
260337	**9**	**Depressor Spring**.....	8735–1056
260338	**10**	**Depressor Reenforcing Spring**.....	8735–1057
260339	**11**	**Cam Follower**.....	9999–2259
260340	**12**	**Shim**.....	12775–17
262020	**13**	**Spring**.....	7770–634
184180	**14**	**Pin**.....	8057–208
260347	**15**	**Armature Dog Guide**.....	9999–2262
260348	**16**	**Latch Pin**.....	8057–221
260349	**17**	**Latch Pin Lock**.....	8034–247
271491	**18**	**Latch**.....	C–16878–18
260350	**19**	**Push Rod**.....	8034–248
260351	**20**	**Cam**.....	9121–198
260353	**21**	**Stop Sleeve Complete**.....	8072–979
260355	**22**	**Sleeve Complete**.....	8072–980

Style "SL-25" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	23	**Trunnion** Ref. 23a with Lock Nut Ref. 23b.	
260356	23a	**Trunnion Only**	8378–388
260357	23b	**Trunnion Lock Nut**	8265–402
262023	24	**Spring**	7770–631
102112	25	**Hasp Complete**	8299–146
103344	26	**Tee Bolt**	8709–65
	27	**Eye Bolt** Ref. 27a with Nut Ref. 27b and ½″ Plain S. Lock Washer (C.N. 47783) (Cad. Pl.).	
260438	27a	**Eye Bolt Only**	8034–231
169406	27b	**½″-20 Hex. Jam Nut**	8265–282
70109	28	**Ventilator Complete**	7318–57
260360	29	**Cover Plate**	9999–2263
	30	**Tap Bolt,** ⅜″-16x1″ Hex. Hd. S. (C.N. 46426) (Cad. Pl.) with ⅜″ Plain S. Lock Washer (C.N. 47779) (Cad. Pl.).	
	31	**Tap Bolt,** ⅜″-16x1″ Hex. Hd. S. (C.N. 46426) (Cad. Pl.) with ⅜″ Plain S. Lock Washer (C.N. 47779) (Cad. Pl.) and $\frac{5}{16}$″ S. Plate Washer (C.N. 47642) (Cad. Pl.).	
	32	**Bolt** Ref. 32a with ¼″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260435	32a	**Slotted Hex. Hd. Bolt,** ¼″x⅞″	8190–323
	33	**Tap Bolt,** ¼″-20x½″ Hex. Hd. S. (C.N. 46402) (Tin Pl.) with ¼″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
	34	**Machine Screw,** No. 10-32x⅞″ Fil. Hd. S. (C.N. 52299) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) (Tin Pl.).	
260374	35	**Shim.** Used under Magnet Bracket (Not Shown)	12775–18

Style "SL-25" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	36	**Machine Screw,** No. 10-32x½″ Fil. Hd. S. (C.N. 52355) (Tin Pl.) For attaching Shim Ref. 35 to Magnet Bracket (Not Shown).	
	37	**Machine Screw,** No. 6-40x$\frac{7}{16}$″ Fil. Hd. S. (C.N. 52394) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.).	
260935	**38**	**Name Plate**	8225–875
54932	**39**	**Rivet**	10301–30
262021	**40**	**Shim**	12775–22
	41	**Machine Screw,** No. 10-32x⅜″ Rd. Hd. S. (C.N. 52564) (Tin Pl.).	
262025	**42**	**Gasket**	8078–1774
263673	**43**	**Cover Plate**	9999–2346
262024	**44**	**Gasket**	8078–1773
41210	**45**	**Washer**	7826–98
260441	**46**	**Indicator Complete**	C–16878–11
260448	**47**	**Spring**	8735–1067
	48	**Machine Screw,** No. 14-24x1⅛″ Fil. Hd. S. (C.N. 52328) (Tin Pl.) with ¼″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
	49	**Tap Bolt,** ¼″-20x¾″ Hex. Hd. S. (C.N. 46404) (Tin Pl.) with ¼″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260359	**50**	**Cover Plate** (1½″ Pipe Tap)	9999–2263
268731	**51**	**Cover Plate** (1¼″ Pipe Tap)	9999–2263
271518	**52**	**Box Connector Adapter Complete**	B–10342–153
266855	**53**	**Gasket**	8078–1784
271516	**54**	**Gasket**	8078–1789

Style "SL-25" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	55	**Tap Bolt,** 1/4″-20x7/8″ Hex. Hd. S. (C.N. 46405) (Tin Pl.) with 1/4″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
	56	**Box Connector,** 1 1/2″ Straight M.I. Galv. (C.N. 70607).	
	57	**Lubricating Fitting,** 1/8″ P.T., 67 1/2° (C.N. 39142).	
	57a	**Lubricating Fitting,** 1/8″ P.T., 65° Pin Type (C.N. 39173).	
	58	**Lubricating Fitting,** 1/8″ P.T., 30° (C.N. 39155).	
	58a	**Lubricating Fitting,** 1/8″ P.T., 25° Pin Type (C.N. 39181).	
	59	**Cotter,** 3/16″x1 1/8″ S. (C.N. 48632) (Tin Pl.).	
	60	**Box Connector,** 1 1/2″ (C.N. 70581).	
	61	**Tap Bolt,** 1/4″-20x1 1/8″ Hex. Hd. S. (C.N. 46407) (Tin Pl.) with 1/4″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260469	62	**Spring Complete**	8735–1073
260466	63	**Spring**	8735–1072
	64	**Machine Screw,** No. 10-32x7/16″ Fil. Hd. S. (C.N. 52360) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) (Tin Pl.).	
262862	65	**Stop Plate**	9999–2328
263669	66	**Cover Complete**	C–9423–14
261572	67	**Housing**	C–16878–13
263671	68	**Spring**	7770–636
209199	69	**Pin**	B–10207–1
	70	**Machine Screw,** No. 10-32x3/8″ Fil. Hd. S. (C.N. 522019) (Tin Pl.) with Washer Ref. 70a.	
73493	70a	**Washer**	7826–78

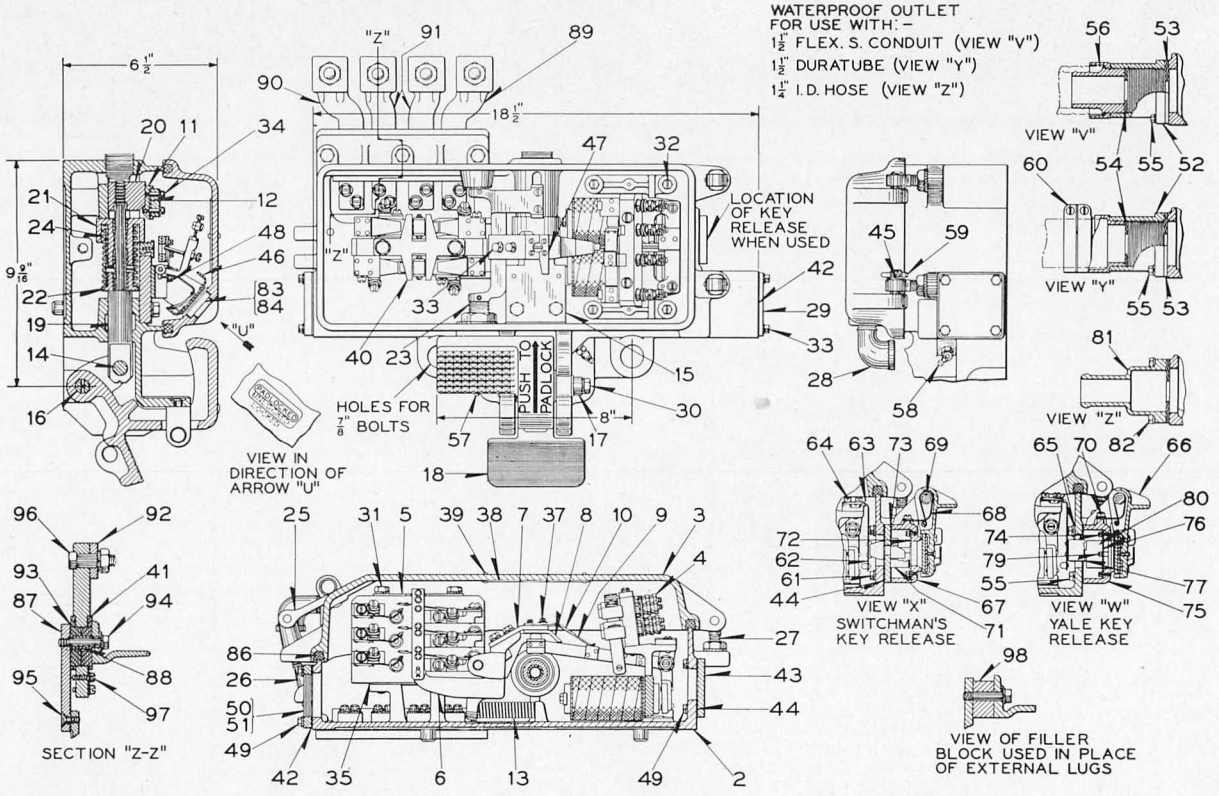
Style "SL-25" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	71	**Key Release Mechanism Complete** (When ordering Key Release Mechanism furnish us with sample of new key)	C–16878–14
	72	**Keyhole Plate**	12858–
260470	73	**Gasket**	8078–1773
	74	**Machine Screw,** No. 8-36x$\frac{7}{16}$″ Fil. Hd. S. (C.N. 52456) (Tin Pl.) with No. 8 Plain S. Lock Washer (C.N. 47681) (Tin Pl.).	
263028	75	**Housing**	C–16878–13
262893	76	**Mounting Plate**	9999–2335
262810	77	**Cam**	12748–65
	78	**Machine Screw,** No. 5-36x½″ Fil. Hd. S. (C.N. 522037) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.) For attaching Cam to Lock (Not Shown).	
	79	**Machine Screw,** No. 6-32x¼″ Fil. Hd. S. (C.N. 52485) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.).	
	80	**Yale Lock** (When ordering Lock furnish us with sample of new key)	12454–
266798	81	**Hose Connection Outlet** for 1¼″ I.D. Hose	B–10342–153
	82	**Tap Bolt,** ¼″-20x1″ Hex. Hd. S. (C.N. 46406) (Tin Pl.) with ¼″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260432	83	**Glass Window**	8163–353
260367	84	**Cover Plate**	9999–2264
	85	**Machine Screw,** No. 10-32x¼″ Flat Hd. S. (C.N. 521031) (Tin Pl.) For attaching Cover Plate Ref. 84 to Cover (Not Shown).	
	86	**Gasket,** $\frac{7}{16}$″ Rd. Packing, 3′ 8¾″ long (C.N. 65314)	



Style "SL-26" Electric Switch Locks

Detail Parts

Style "SL-26" Electric Switch Locks

Detail Parts

Ordering references for complete Locks will be found on Plate E-5735.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
260331	2	**Housing Complete.** Arranged for ¾" thick lever	D–2583–1
	2a	**Housing Complete.** Arranged for 1" thick lever	D–2583–1
260451	3	**Cover Complete**	D–2583–2
	4	**Magnet Assembly Complete.** For details and assemblies refer to Plate E-5750	C–16878–1
	5	**Cam Operated Contact Spring Board Complete.** For details and assemblies refer to Plate E-5750	C–16878–2
257102	6	**Contact Operating Lever**	C–16878–3
260335	7	**Depressor Bracket**	10914–1872
260336	8	**Depressor**	10914–1873
260337	9	**Depressor Spring**	8735–1056
260338	10	**Depressor Reenforcing Spring**	8735–1057
260339	11	**Cam Follower**	9999–2259
260340	12	**Shim**	12775–17
260436	13	**Spring**	7770–626
184180	14	**Pin**	8057–208
260347	15	**Armature Dog Guide**	9999–2262
260348	16	**Latch Pin**	8057–221
260349	17	**Latch Pin Lock**	8034–247
271491	18	**Latch**	C–16878–18
260350	19	**Push Rod**	8034–248
260351	20	**Cam**	9121–198
260353	21	**Stop Sleeve Complete**	8072–979
260355	22	**Sleeve Complete**	8072–980

Style "SL-26" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	23	**Trunnion** Ref. 23a with Lock Nut Ref. 23b.	
260356	23a	**Trunnion Only**	8378–388
260357	23b	**Trunnion Lock Nut**	8265–402
260437	24	**Spring**	7770–627
102112	25	**Hasp Complete**	8299–146
103344	26	**Tee Bolt**	8709–65
	27	**Eye Bolt** Ref. 27a with Nut Ref. 27b and ½″ Plain S. Lock Washer (C.N. 47783) (Cad. Pl.).	
260438	27a	**Eye Bolt Only**	8034–231
169406	27b	½″-20 **Hex. Jam Nut**	8265–282
70109	28	**Ventilator Complete**	7318–57
260360	29	**Cover Plate**	9999–2263
	30	**Tap Bolt,** ⅜″-16x1″ Hex. Hd. S. (C.N. 46426) (Cad. Pl.) with ⅜″ Plain S. Lock Washer (C.N. 47779) (Cad. Pl.).	
	31	**Tap Bolt,** ⅜″-16x4¼″ Hex. Hd. S. (C.N. 46440) (Cad. Pl.) with ⅜″ Plain S. Lock Washer (C.N. 47779) (Tin Pl.).	
	32	**Bolt** Ref. 32a with ¼″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260435	32a	**Slotted Hex. Hd. Bolt,** ¼″x⅞″	8190–323
	33	**Tap Bolt,** ¼″-20x½″ Hex. Hd. S. (C.N. 46402) (Tin Pl.) with ¼″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
	34	**Machine Screw,** No. 10-32x⅞″ Fil. Hd. S. (C.N. 52299) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) (Tin Pl.).	
260374	35	**Shim.** Used under Magnet Bracket and Cam Operated Contact Spring Board	12775–18

Style "SL-26" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	36	**Machine Screw,** No. 10-32x½" Fil. Hd. S. (C.N. 52355) (Tin Pl.) For attaching Shim Ref. 35 to Magnet Bracket (Not Shown).	
	37	**Machine Screw,** No. 6-40x$\frac{7}{16}$" Fil. Hd. S. (C.N. 52394) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.).	
260935	38	**Name Plate**	8225–875
54932	39	**Rivet**	10301–30
260342	40	**Guide**	9999–2260
260343	41	**Contact Bracket Insulation**	C–16878–9
262025	42	**Gasket**	8078–1774
263673	43	**Cover Plate**	9999–2346
262024	44	**Gasket**	8078–1773
41210	45	**Washer**	7826–98
260441	46	**Indicator Complete**	C–16878–11
260448	47	**Spring**	8735–1067
	48	**Machine Screw,** No. 14-24x1⅛" Fil. Hd. S. (C.N. 52328) (Tin Pl.) with ¼" Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
	49	**Tap Bolt,** ¼"-20x¾" Hex. Hd. S. (C.N. 46404) (Tin Pl.) with ¼" Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260359	50	**Cover Plate** (1½" Pipe Tap)	9999–2263
268731	51	**Cover Plate** (1¼" Pipe Tap)	9999–2263
271518	52	**Box Connector Adapter Complete**	B–10342–153
266855	53	**Gasket**	8078–1784
271516	54	**Gasket**	8078–1789

Style "SL-26" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	55	**Tap Bolt,** 1/4"-20x7/8" Hex. Hd. S. (C.N. 46405) (Tin Pl.) with 1/4" Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
	56	**Box Connector,** 1 1/2" Straight M.I. Galv. (C.N. 70607).	
	57	**Lubricating Fitting,** 1/8" P.T., 67 1/2° (C.N. 39142).	
	58	**Lubricating Fitting,** 1/8" P.T., 30° (C.N. 39155).	
	59	**Cotter,** 3/16"x1 1/8" S. (C.N. 48632) (Tin Pl.).	
	60	**Box Connector,** 1 1/2" (C.N. 70581).	
	61	**Tap Bolt,** 1/4"-20x1 1/8" Hex. Hd. S. (C.N. 46407) (Tin. Pl.) with 1/4" Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260469	62	**Spring Complete**	8735–1073
260466	63	**Spring**	8735–1072
	64	**Machine Screw,** No. 10-32x7/16" Fil. Hd. S. (C.N. 52360) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) (Tin Pl.).	
262862	65	**Stop Plate**	9999–2328
263669	66	**Cover Complete**	C–9423–14
261572	67	**Housing**	C–16878–13
263671	68	**Spring**	7770–636
209199	69	**Pin**	B–10207–1
	70	**Machine Screw,** No. 10-32x3/8" Fil. Hd. S. (C.N. 522019) (Tin Pl.) with Washer Ref. 70a.	
73493	70a	**Washer**	7826–78
	71	**Key Release Mechanism Complete** (When ordering Key Release Mechanism furnish us with sample of new key)	C–16878–14
	72	**Keyhole Plate**	12858–

Style "SL-26" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
260470	**73**	**Gasket**	8078–1773
	74	**Machine Screw,** No. 8-36x$\frac{7}{16}$" Fil. Hd. S. (C.N. 52456) (Tin Pl.) with No. 8 Plain S. Lock Washer (C.N. 47681) (Tin Pl.).	
263028	**75**	**Housing**	C–16878–13
262893	**76**	**Mounting Plate**	9999–2335
262810	**77**	**Cam**	12748–65
	78	**Machine Screw,** No. 5-36x½" Fil. Hd. S. (C.N. 522037) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.) For attaching Cam to Lock (Not Shown).	
	79	**Machine Screw,** No. 6-32x¼" Fil. Hd. S. (C.N. 52485) (Tin Pl.) with No. 6 Plain S. Lock Washer (C.N. 47662) (Tin Pl.).	
	80	**Yale Lock** (When ordering furnish us with sample of new key)	12454–
266798	**81**	**Hose Connection Outlet** for 1¼" I.D. Hose	B–10342–153
	82	**Tap Bolt,** ¼"-20x1" Hex. Hd. S. (C.N. 46406) (Tin Pl.) with ¼" Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
260432	**83**	**Glass Window**	8163–353
260367	**84**	**Cover Plate**	9999–2264
	85	**Machine Screw,** No. 10-32x¼" Flat Hd. S. (C.N. 521031) (Tin Pl.) For attaching Cover Plate Ref. 84 to Cover (Not Shown).	
	86	**Gasket,** $\frac{7}{16}$" Rd. Packing, 3'-8¾" long (C.N. 65314)	
260344	**87**	**Plate**	C–16878–9
260345	**88**	**Bushing**	B–10273–1
260433	**89**	**L.H. Contact Bracket**	C–16878–4

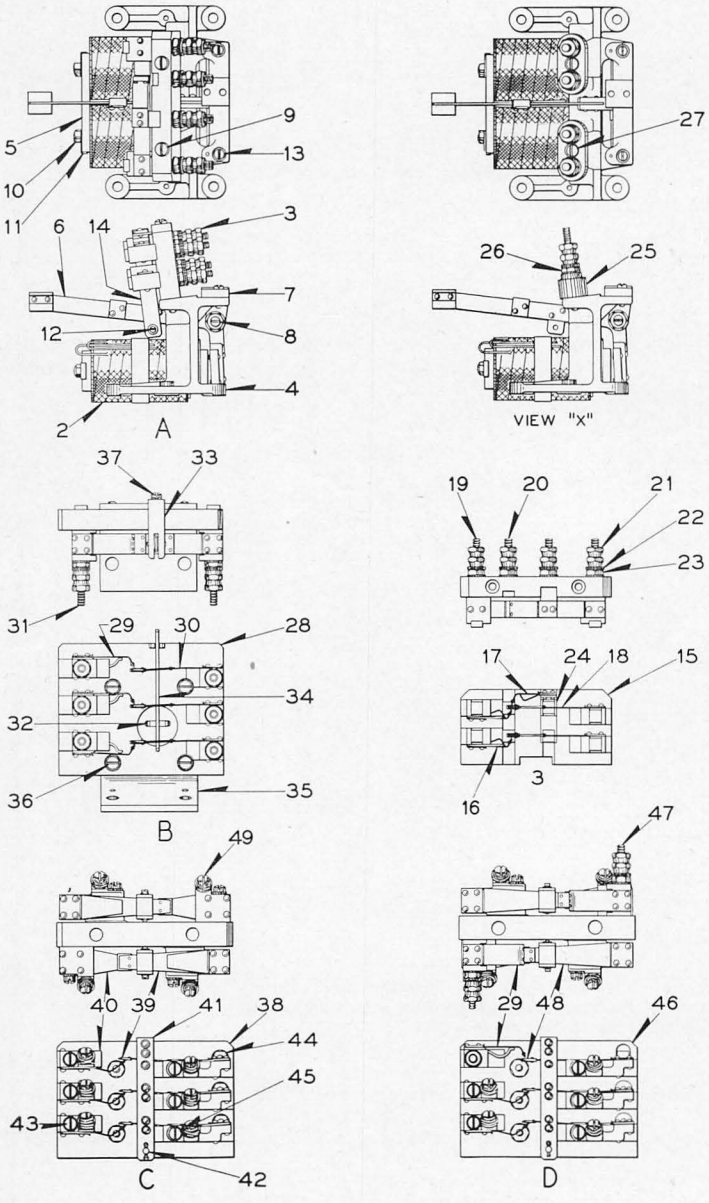
Style "SL-26" Electric Switch Locks

Detail Parts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
257394	**90**	**R.H. Contact Bracket**	C–16878–4
257395	**91**	**Inside Contact Bracket**	C–16878–4
188796	**92**	**Bond Wire Clamp**	8065–219
260346	**93**	**Insulation**	C–16878–9
	94	**Tap Bolt,** $\frac{3}{8}$″-16x1$\frac{3}{4}$″ Hex. Hd. S. (C.N. 46432) (Cad. Pl.) with $\frac{3}{8}$″ Plain S. Lock Washer (C.N. 47779) (Tin Pl.).	
	95	**Machine Screw,** $\frac{3}{8}$″-16x$\frac{3}{4}$″ Flat Hd. S. (C.N. 52045) (Cad. Pl.).	
	96	**Bolt** Ref. 96a with $\frac{1}{2}$″ Plain Ph. Bz. Lock Washer (C.N. 47751) (N.P.) and Nut Ref. 96b.	
189429	**96a**	**Bolt Only**	8280–45
152128	**96b**	**Nut**	8109–29
	97	**Machine Screw,** No. 14-24x$\frac{3}{4}$″ Fil. Hd. Br. (C.N. 51342) (N.P.) with $\frac{1}{4}$″ Plain S. Lock Washer (C.N. 47775) (Tin Pl.) and Washer Ref. 97a.	
29102	**97a**	**Washer**	7828–139
273453	**98**	**Filler Block.** Used in place of external lugs	9999–2496



Magnet and Contact Spring Assemblies

Styles "SL-25" and "SL-26" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Magnet and Contact Spring Assembly with one dependent front and back contact and one independent back contact operated by armature, for Style "SL-25" and "SL-26" Electric Switch Locks.

Piece	Ref.	Coils (Ohms per pair)	Drawing Reference
	A	50	C–16878–1
	Aa	75	C–16878–1
272575	**Ab**	120	C–16878–1
274513	**Ac**	180	C–16878–1
260456	**Ad**	280	C–16878–1
260333	**Ae**	440	C–16878–1
	Af	670	C–16878–1
	Ag	1000	C–16878–1
		If Magnet Assembly without Contact Springs as shown by View "X" is desired, orders should so state.	

Piece	Ref.	Description	Drawing Reference
262018	**B**	**Cam Operated Spring Board Complete** with 2 normally closed and 1 normally open cam operated contacts as shown in full lines for "SL-25" Electric Switch Locks	C–16878–15
268727	**Ba**	**Cam Operated Spring Board Complete** with 2 normally open and 1 normally closed cam operated contacts as shown in dot and dash lines for "SL-25" Electric Switch Locks	C–16878–15
260334	**C**	**Cam Operated Spring Board Complete** with 6 normally open contacts for "SL-26" Electric Switch Locks	C–16878–2

Styles "SL-25" and "SL-26" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
273455	D	**Cam Operated Spring Board Complete** with 4 normally open and 2 reversible contacts for "SL-26" Electric Switch Locks	C–16878–2
243096	2	**Coil,** 25-Ohms	8133–429
245121	2a	**Coil,** 37.5-Ohms	8133–429
243618	2b	**Coil,** 60-Ohms	8133–429
237888	2c	**Coil,** 90-Ohms	8133–429
197744	2d	**Coil,** 140-Ohms	8133–429
183228	2e	**Coil,** 220-Ohms	8133–429
184065	2f	**Coil,** 335-Ohms	8133–429
209322	2g	**Coil,** 500-Ohms	8133–429
260369	3	**Contact Spring Board Complete**	C–16878–6
260370	4	**Core Assembly Complete**	C–16878–10
183441	5	**Back Strap**	8162–250
260371	6	**Armature Bar Complete**	8130–338
260454	7	**Pivot Bracket**	8303–137
183454	8	**Trunnion Screw** Ref. 8a with Nut Ref. 8b	12471–5
57995	8a	**Trunnion Screw Only**	12471–5
29577	8b	**Nut**	8109–205
	9	**Machine Screw,** No. 14-24x2⅝″ Fil. Hd. S. (C.N. 52458) (Tin Pl.) with ¼″ Plain S. Lock Washer (C.N. 47521) (Tin Pl.) and Washer Ref. 9a.	
18757	9a	**Washer**	7828–104
	10	**Cap Screw,** ¼″-28x¾″ Hex. Hd. S. (C.N. 50014) (Tin Pl.).	
54713	11	**Bolt Lock**	8486–267

Styles "SL-25" and "SL-26" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	12	**Screw** Ref. 12a with No. 6-32 Elastic Stop Nut (C.N. 48142).	
260372	12a	**Screw Only**	8098–1486
	13	**Machine Screw,** No. 10-32x½" Fil. Hd. S. (C.N. 52355) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) (Tin Pl.).	
260373	14	**Driver**	8750–3282
260383	15	**Terminal Board**	9968–1374
260384	16	**Stationary Contact Spring Complete**	8385–2821
260385	17	**Stationary Contact Spring Complete**	8385–2822
260386	18	**Movable Contact Spring Complete**	8385–2823
	19	**Binding Post** with Nuts and Washers (Inc. 1-19a, 2-21, 3-22 and 1-23)	12451–
118271	19a	**Binding Post Only**	8094–1192
	20	**Binding Post** with Nuts and Washers (Inc. 1-20a, 2-21, 3-22 and 1-23)	12451–
122782	20a	**Binding Post Only**	8094–1192
29101	21	**Nut**	8109–193
29102	22	**Washer**	7828–139
29103	23	**Nut**	8109–194
188259	24	**Lock Washer**	8486–310
	25	**Terminal Block** with Nuts and Washers (Inc. 1-25a, 4-21, 6-22 and 2-26).	
267093	25a	**Terminal Block** without Nuts and Washers	9968–1395
127260	26	**Nut**	8109–194

Styles "SL-25" and "SL-26" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	27	**Machine Screw,** No. 14-24x$\frac{3}{4}$" Fil. Hd. S. (C.N. 52325) (Tin Pl.) with $\frac{1}{4}$" Plain S. Lock Washer (C.N. 47521) (Tin Pl.) and Washer Ref. 9a.	
262019	28	**Terminal Board**	9968–1378
262002	29	**Stationary Contact Spring Complete**	8385–2840
262008	30	**Movable Contact Spring Complete**	8385–2842
	31	**Binding Post** with Nuts and Washers (Inc. 1-31a, 2-21, 3-22 and 1-23)	12451–
143690	31a	**Binding Post Only**	8094–1192
	32	**Rocker Pin** Ref. 32a with two $\frac{1}{16}$"x$\frac{3}{8}$" S. Cotters (C.N. 48601) (Tin Pl.).	
262013	32a	**Rocker Pin Only**	8097–565
262015	33	**Driver Guide**	10914–1900
262012	34	**Driver**	8750–3299
262016	35	**Bracket**	10914–1901
	36	**Machine Screw,** No. 14-24x$\frac{5}{8}$" Fil. Hd. S. (C.N. 52324) (Tin Pl.) with $\frac{1}{4}$" Plain S. Lock Washer (C.N. 47775) (Tin Pl.) and Washer Ref. 36a.	
37764	36a	**Washer**	7828–166
	37	**Machine Screw,** No. 10-32x$\frac{7}{16}$" Fil. Hd. S. (C.N. 52360) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N. 47733) (Tin Pl.).	
260375	38	**Terminal Board**	C–16878–8
260430	39	**Movable Contact Spring Complete** (Includes Screw Ref. 49)	8385–2832
260429	40	**Stationary Contact Spring Complete** (Includes Screw Ref. 49)	8385–2831
260415	41	**Driver Complete**	12748–60
	42	**Driving Pin** Ref. 42a with two $\frac{1}{16}$"x$\frac{3}{8}$" S. Cotters (C.N. 48601) (Tin Pl.).	

Styles "SL-25" and "SL-26" Electric Switch Locks

Detail Parts

Magnet and Contact Spring Assemblies

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
260418	42a	**Driving Pin Only**	8097–979
	43	**Machine Screw,** No. 14-24x1⅝" Fil. Hd. Br. (C.N. 51396) (N.P.) with ¼" Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
189737	44	**Nut**	8109–218
	45	**Machine Screw,** No. 14-24x1¾" Fil. Hd. Bz. (C.N. 51447) (N.P.) with ¼" Plain S. Lock Washer (C.N. 47775) (Tin Pl.).	
273454	46	**Terminal Board**	C–16878–19
	47	**Binding Post** with Nuts and Washers (Inc. 1-19a, 2-21, 3-22 and 1-26)	12451–
273452	48	**Movable Contact Spring Complete** (Includes Screw Ref. 49)	8385–2873
	49	**Machine Screw,** No. 14-24x½" Fil. Hd. Br. (C.N. 51340) (N.P.) with ¼" Plain S. Lock Washer (C.N. 47775) (Tin Pl.) and two Washers Ref. 22.	

ELECTRIC SWITCH LOCK WITH INDICATOR FOR OUTLYING SWITCHES

The Switch Lock illustrated and described herein, is a device of exceptional merit for controlling the entrance or exit of trains to or from yards, passing sidings, and similar situations. It consists of an electrically locked lever which, when manually operated, lifts a locking plunger from a hole in the switch lock rod. The electric lock may be controlled from any desired point such as a tower, telegraph office, track circuit, etc.

A trainman can gain access to the operating lever and obtain a view of the indicator by unlocking the front door of the mechanism with a standard R.R. switch key. The maintainer can inspect the mechanism by unlocking the rear door. The lock stand is cast with a duct for carrying wires to the electric lock, and may be furnished with or without terminals in the base of the stand.

The high stand with junction box has a 2¼″ hole through the base for entrance of Parkway cable or wires from a conduit and a 2″ knockout in one side of the base for conduit wire entrance above the tie level. The low stand without junction box provides a socket for trunking or box connector adapter. (See Plate E-5801).

The hand-operating lever operates six controller contacts in addition to the locking segment and the switch lock plunger. The armature operates one normally open contact and one normally closed contact, and also an indicator which shows when the switch points may be unlocked. The locking segment is notched to lock the lever in the normal position with the magnet deenergized. It may also be notched to lock the lever in the reverse position.

PUSH BUTTONS

A door-operated circuit controller to close 2 normally open circuits when the door is open, is supplied as standard equipment. The same push rod is operated when the door is closed to open the circuits and also to develop a force-drop action on the armature bar, and to hold it against vibration as a result of track conditions. (See Plate E-5807).

Space is also available in the lock for mounting extra equipment.

Emergency mechanical release D and two manually (or door) operated push button circuit controllers A, B, C or E of Plate E-5817 can be furnished when specified on order.

SWITCH OPERATION

To unlock the switch, it is necessary for the trainman to open the door with a switch key. This operation, by release of spring-operated mechanism, automatically closes the magnet contact and relieves the force-drop pressure on the armature bar so it may op-

erate. If the magnet is energized through its control, the indicator shows "unlocked" and the lever may be thrown 180 degrees to the full left position thus operating the pin connection of the plunger lock rod past the vertical center of the bearing so the lever will stand by gravity action in the full left position. At this position the plunger is withdrawn from the lock rod and the switch may be thrown.

There are two optional door designs which determine the sequence of action involved to restore the switch points and electric lock to normal.

(a) One scheme employs a radial lug on the inside of the door which, due to interference with the lever handle, prevents the door being closed unless the lever is moved (approximately half way) toward normal until the lock plunger rests on top of the lock rod. When this scheme is used, the switchman can partially restore the lever to normal, close and padlock the door and as his last operation, restore the switch points the instant the train clears. The switch lock action is automatic.

(b) Another method of operation is obtained by a radial lug located on the inside of the door so that the door cannot be closed until the lock lever is in the full normal position. This means that the last act of the switchman before boarding his train is to close and padlock the electric lock door.

TELEPHONE

The telephone set is designed with great care and with special reference to the hard usage to which it is subjected in installations of this character.

The handset is of the modern "French Type" with high efficiency transmitter and receiver units and with a "push-to-talk" button in the handle. Maximum receiver efficiency is provided when the "push-to-talk" button is released. With the "push-to-talk" button released the local batteries are disconnected from the telephone circuit so there is no current drain on the batteries except during actual transmission.

On telephones designated for use on lines where C.T.C. is involved, the circuit provides for breaking both sides of the line when the handset is in place on the hook. For these applications the insulation of the switch-hook contacts is built to A.A.R. Signal Section standards and is tested to withstand 3000 volts.

All parts are easily accessible for repair or inspection. The door is designed for locking with a Railroad switch padlock and to be opened only with the Railroad switch lock key.

APPLICATION INFORMATION FOR TELEPHONE

(Plate E-5813)

1. When telephones are to be installed on lines where *no* C.T.C. is involved, they may be equipped with generators and ringers, if desired.

2. When telephones are to be installed on lines where C.T.C. *is* involved, sets without generators and without ringers must be ordered, either complete with protective filters or with filters ordered separately for installation outside the telephone case, as follows:

(a) For C.T.C. lines where carrier frequencies are involved, order Telephone Ref. B, or order separately Telephone Ref. Bb, and Filters Ref. 54b and Ref. 54c for connection in series between the telephone and the line.

(b) For C.T.C. lines where carrier frequencies are not involved, order Telephone, Ref. Ba, or order separately Telephone Ref. Bb, and Filter Ref. 54d for connection between the telephone and the line.

ORDERING INSTRUCTIONS FOR COMPLETE STYLE "SL-6A" D.C. ELECTRIC SWITCH LOCK WITH INDICATOR; LAYOUTS AND FITTINGS FOR SWITCHES

LAYOUT AND FITTINGS:

In cataloging the Electric Switch Lock we show only typical layouts giving general information. Orders for complete switch layouts and fittings should be accompanied with the following information:

1. Dimensioned print of the layout to which the Electric Switch Lock is to be applied, showing: (Refer to Plate E-5801).
   (a) Switch Point dimensions U-V-W-X-Y-Z, and Size of Holes T.
   (b) Cross section of ties giving face and depth. Plan should show spacing of ties and dimension from end of point to edge of point tie.
   (c) Weight and section of rail.
   (d) Switch Throw.
   (e) Distance "P" between center of switch rod and end of switch point.
   (f) General plan of wire conduits between the lock, U-5 Controllers; and Junction Boxes.
2. Reference or plan showing design and dimensions:
   (a) Rail Braces and Rail Clips.†
   (b) Thickness of Gage and Riser Plates.†
   †Specify whether to be furnished by Railroad or by U.S. & S. Co.
   (c) Distance of Electric Switch Lock from gage will be 9′ 0″ for installation on outside of track; 4′ 2″ for installation between tracks unless otherwise specified.
3. State whether R.H. or L.H. Layout.
4. When ordering Layouts care should be taken to specify the Reference Number on Plate E-5803 for the Electric Switch Lock desired.
5. State whether "U-5" Circuit Controller is desired (If desired, orders should refer to Plate J-1047).
6. If special Wire Outlets, as shown in Refs. 13, 14, 15, 16 and 20 of Plate E-5801, are desired, orders should so state.

7. If extra Push Button Circuit Controller (Refs. A, B, C or E) or Sealed Mechanical Emergency Release (Ref. D) as shown on Plate E-5817 is desired, orders should specify.

8. The following characteristics will be considered as standard for Electric Switch Locks and will be furnished on all orders unless otherwise specified.

   (a) Indicator Blades or Discs, enameled red. Indicator Cards will show "Unlocked" in black letters on white background, and "Locked" in red letters on white background.

   (b) Magnet Coils wound to 250-ohms per pair.*

   (c) One normally open and one normally closed Armature Contacts.

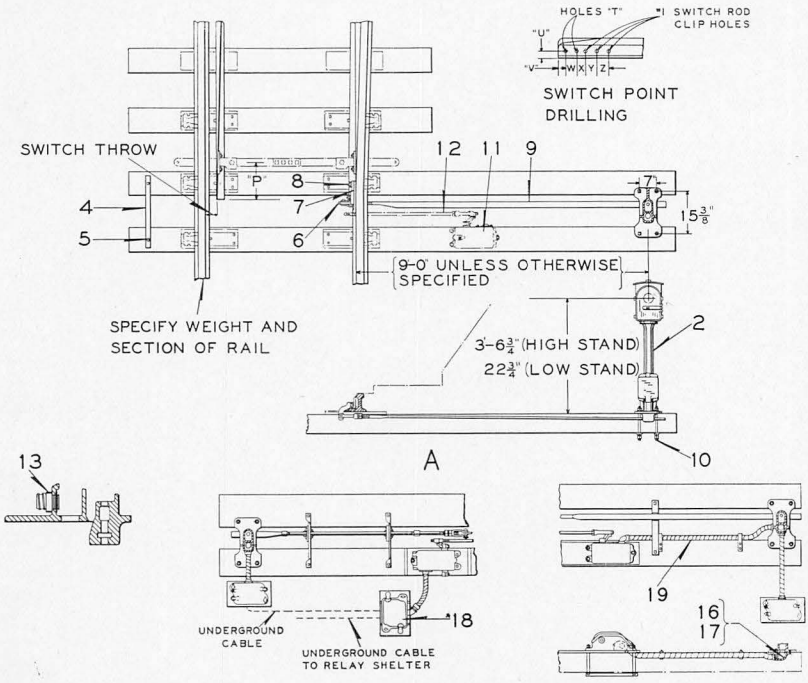
   (d) Two normally open Door Operated Contacts.

   (e) Roller Contacts: Three closed in normal position, and three closed in reverse position.

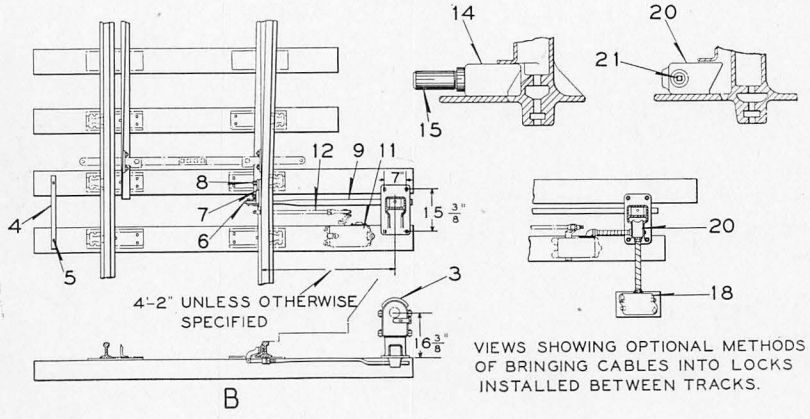
   *For other available resistances see the following table giving Operating Data.

OPERATING DATA

Minimum Allowable Service Voltage At Lock	Resistance per pair of Coils	Minimum Allowable Service Voltage At Lock	Resistance per pair of Coils
3.08	50	10.75	500
4.60	100	12.00	670
5.47	150	14.5	1000
6.90	200	92.75	3250 (250-ohm Coils and 3000-ohm resistor)
7.13	250	161.25	7500 (500-ohm Coils and 7000-ohm resistor)



VIEWS SHOWING OPTIONAL METHODS OF BRINGING CABLES INTO HIGH LOCK STANDS



VIEWS SHOWING OPTIONAL METHODS OF BRINGING CABLES INTO LOCKS INSTALLED BETWEEN TRACKS.

Layouts of Style "SL-6A" Electric Switch Locks Applied to Single Switches

Layouts of Style "SL-6A" D. C. Electric Switch Lock with Indicator Applied To Single Switches

Orders for complete layouts and fittings should be accompanied by information listed on Plate E-5800.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

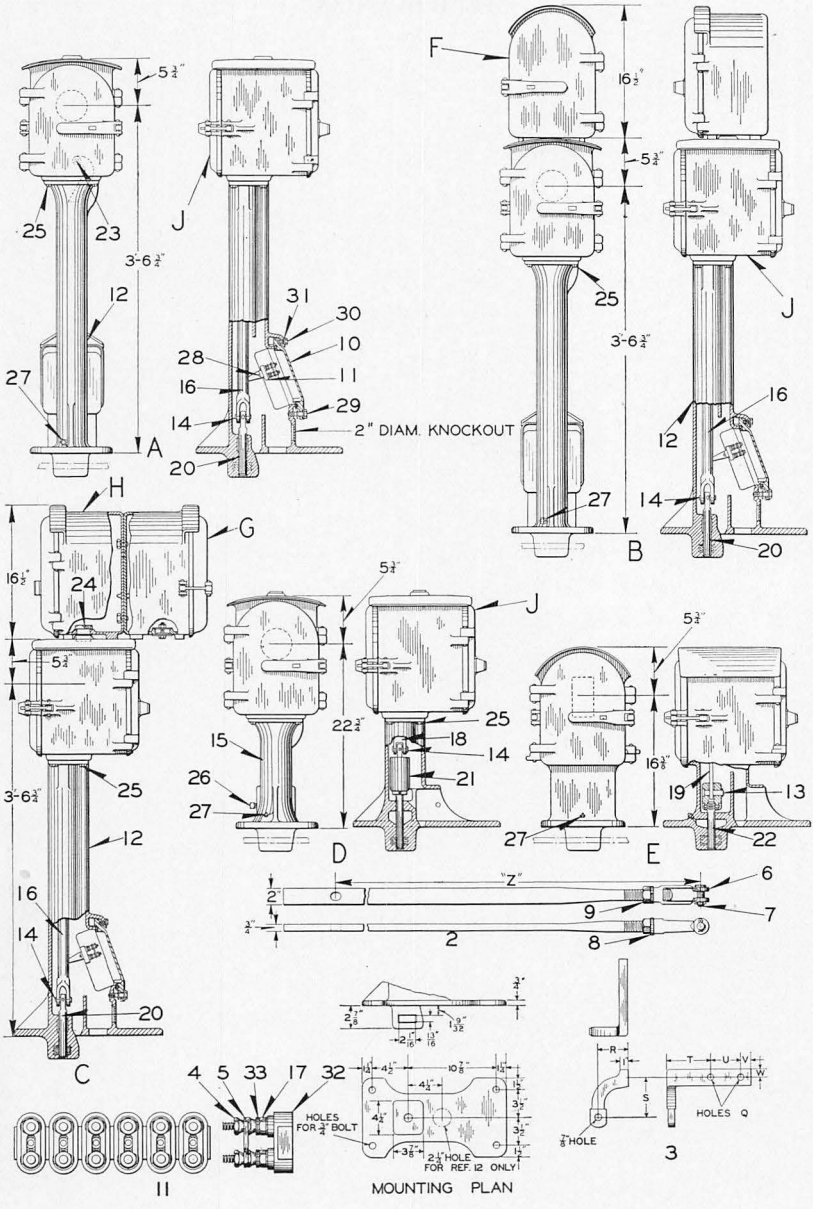
Piece	Ref.	Description	Drawing Reference
	A	**R.H. Layout of Style "SL-6A" Electric Switch Lock** as shown in full lines applied to Single Switch.....	C–9336–
	Aa	**L.H. Layout of Style "SL-6A" Electric Switch Lock** as shown in full lines applied to Single Switch.....	C–9336–
	B	**R.H. Layout of Style "SL-6A" Electric Switch Lock** as shown in full lines applied to Single Switch (For installation between Tracks).....	C–9336–
	Ba	**L.H. Layout of Style "SL-6A" Electric Switch Lock** as shown in full lines applied to Single Switch (For installation between Tracks).....	C–9336–
	2	**Style "SL-6A" Electric Switch Lock Complete** (When ordering refer to Plate E-5803).....	C–8117–
	2a	**Style "SL-6A" Electric Switch Lock with Telephone Attachment** (When ordering refer to Plate E-5803)	C–8117–
	3	**Style "SL-6A" Electric Switch Lock Complete,** for installation between tracks (When ordering refer to Plate E-5803).....	C–8117–
127876	4	**Tie Bar,** 2′-2″ long (20″ Bolt hole spacing).....	B–9613–26
	5	**Lag Screw,** $\frac{3}{4}$″x6″.	
	6	**R.H. Switch Foot** (When ordering refer to Plate E-5803).....	B–8181–
	6a	**L.H. Switch Foot** (When ordering refer to Plate E-5803).....	B–8181–
	7	**Controller Operating Lug** (When ordering refer to Plate J-1061).....	B–8060–
	8	**Bolt** with $\frac{3}{4}$″ Hex. Nut and $\frac{3}{4}$″ Pl. S. Lock Washer ($\frac{5}{16}$″x$\frac{7}{32}$″) (Orders should specify length of Bolt desired).	
	9	**Lock Rod with Screw Jaw and Pin** (When ordering refer to Plate E-5803).....	B–8166–

Layouts of Style "SL-6A" D. C. Electric Switch Lock with Indicator Applied To Single Switches

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	10	**Stud** with three ¾″ Sq. Nuts, ¾″ Pl. S. Lock Washer (5/16″x7/32″) and ¾″ S. Plate Washer. Orders should specify length of Stud desired. For attaching Electric Switch Lock to Ties	8261–
10478	10a	**Foundation Bolt,** ¾″x18″ with ¾″ Hex. Nut. For attaching Electric Switch Lock to concrete foundation	7913–44
	11	**Style "U-5" Switch Circuit Controller** (When ordering refer to Plate J-1047)	D–1576–
	12	**Circuit Controller Operating Rod** with Ball and Socket Lug and Spring Type Ball and Socket Lug (When ordering refer to Plate J-1061)	B–10287–
	13	**1½″ Straight Box Connector** with 1½″ Lock Nut and 1½″ Conduit Bushing. For use with Lock Stand having Terminal Board Compartment.	
178417	14	**Box Connector Adapter** (1½″ Pipe Tap) For use with Lock Stand not having Terminal Board Compartment	B–10342–73
208733	14a	**Box Connector Adapter** (2″ Pipe Tap) for use with Lock Stand not having Terminal Board Compartment	B–10342–73
208740	15	**Nipple** (2″ Pipe Threads) For use with Ref. 14a	B–10925–3
238837	16	**Box Connector Adapter.** For use with Lock Stand having Terminal Board Compartment	B–10342–141
239339	17	**Gasket**	8078–1737
	18	**Junction Box** (When ordering refer to Section "L" Catalog)	C–9180–
	19	**Conduit,** 1½″ Galv. S. S. Flexible Steel (Orders should specify length desired).	
238814	20	**Box Connector Adapter.** With 1½″ Pipe Tap in each side and one end. For use with Lock Stand not having Terminal Board compartment	B–10342–73
	21	**Pipe Plug,** 1½″ C. I.	



Style "SL-6A" D. C. Electric Switch Locks With Indicators (With and without Telephone Attachments)

Style "SL-6A" D. C. Electric Switch Locks With Indicators (With and without Telephone Attachments)

All Switch Locks with Indicators will be furnished as noted in Paragraph 8 of Plate E-5800 unless otherwise specified.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "SL-6A" D.C. Electric Switch Lock with Indicator with Lock Stand, Using Mechanism Ref. ..... Plate E-.....** (Orders should specify Mechanism desired by referring to Plate E-5805 or E-5807)	C–8117–8
	B	**Style "SL-6A" D.C. Electric Switch Lock with Indicator with Lock Stand and Telephone Attachment, Using Mechanism Ref..... Plate E-.....** (Orders should specify Mechanism desired by referring to Plate E-5805 or E-5807)	C–8117–8
	C	**Style "SL-6A" D.C. Electric Switch Lock with Indicator with Lock Stand, Telephone Attachment and Extra Case, Using Mechanism Ref..... Plate E-.....** (Orders should specify Mechanism desired by referring to Plate E-5805 or E-5807) ...	C–8117–6
	D	**Style "SL-6A" D.C. Electric Switch Lock with Indicator with Lock Stand, Using Mechanism Ref. ..... Plate E-.....** (Orders should specify Mechanism desired by referring to Plate E-5805 or E-5807)	C–8117–2
	E	**Style "SL-6A" D.C. Electric Switch Lock with Indicator, Using Mechanism Ref..... Plate E-5809** for installation between tracks. (Orders should specify Mechanism desired by referring to Plate E-5809)	C–8117–5
	F	**Telephone Attachment and Case Complete** (When ordering assemblies or details refer to Plate E-5813)	C–8638–
	G	**Telephone Attachment and Case Drilled for Back to Back Mounting** (When ordering assemblies or details refer to Plate E-5813)	C–8117–6
	H	**Extra Case Complete** for back to back mounting (When ordering assemblies or details refer to Plate E-5813)	C–8117–6
	J	**Style "SL-6A" D.C. Electric Switch Lock Mechanism with Indicator** (Semaphore or Disc Type Indication) Without Lock Stand (When ordering refer to Plate E-5805)	D–1591–10

Style "SL-6A" D. C. Electric Switch Locks With Indicators (With and without Telephone Attachments)

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

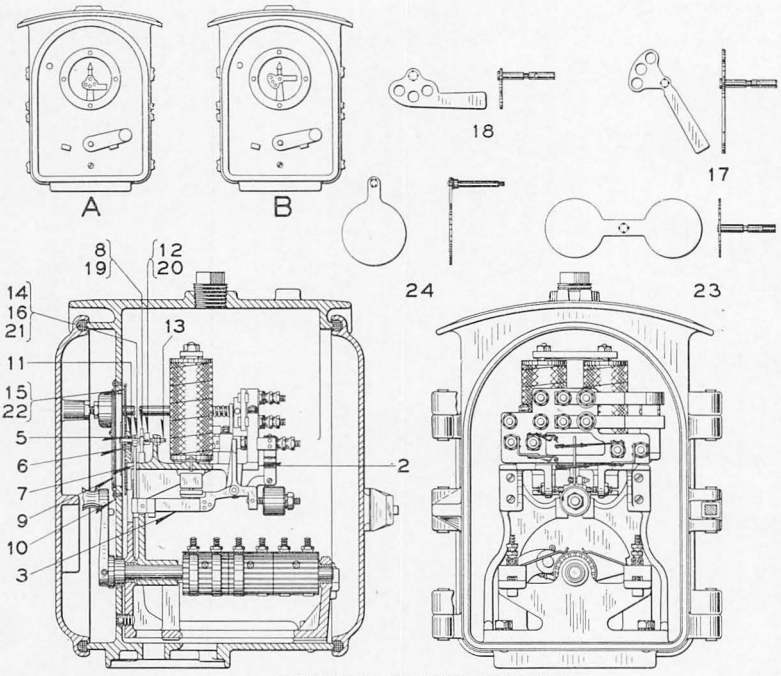
Piece	Ref.	Description	Drawing Reference
	Ja	**Style "SL-6A" D.C. Electric Switch Lock Mechanism with Indicator** (Indicator Indication) Without Lock Stand (When ordering refer to Plate E-5807)	D–1591–8
	2	**Lock Rod with Screw Jaw and Pin** (Orders should specify "Z" dimension) If a Lock Rod other than a straight one is desired orders should be accompanied with a plan of the Rod showing sets desired	B–8166–
	3	**R.H. Switch Foot** (Orders should specify weight and section of rail, R-S-T-U-V-W Dimensions and size of holes Q)	B–8181–
	3a	**L.H. Switch Foot** (Orders should specify weight and section of rail, R-S-T-U-V-W Dimensions and size of holes Q)	B–8181–
29101	4	**Nut**	8109–193
56224	5	**Terminal Connector**	8064–348
883	6	**Screw Jaw**	7742–4
22589	7	**Pin,** $\frac{7}{8}$″x2$\frac{1}{4}$″ with $\frac{3}{16}$″x1$\frac{1}{2}$″ S. Cotter	B–10338–1
	8	**Lock Washer,** 1$\frac{1}{4}$″ Pl. S. ($\frac{7}{16}$″x$\frac{1}{4}$″).	
	9	**Hex. Nut,** 1$\frac{1}{4}$″.	
103526	10	**Lock Stand Cover** with Gasket Ref. 10a	C–8118–15
	10a	**Gasket,** $\frac{3}{8}$″x$\frac{3}{8}$″x2′-6″ long Jute Packing.	
178389	11	**Terminal Board Complete**	9968–1075
103524	12	**Lock Stand** (No Cover)	C–8118–14
11680	13	**Pin,** $\frac{5}{8}$″x2$\frac{9}{16}$″ with $\frac{3}{16}$″x1$\frac{1}{8}$″ S. Cotter (Tin Pl.)	B–10218–1
43647	14	**Pin,** $\frac{5}{8}$″x1$\frac{5}{8}$″ with $\frac{3}{16}$″x2$\frac{1}{4}$″ S. Cotter	8057–158
136338	15	**Lock Stand**	C–8118–7
43635	16	**Up and Down Rod**	B–7725–39
127260	17	**Nut**	8109–194

Style "SL-6A" D. C. Electric Switch Locks With Indicators (With and without Telephone Attachments)

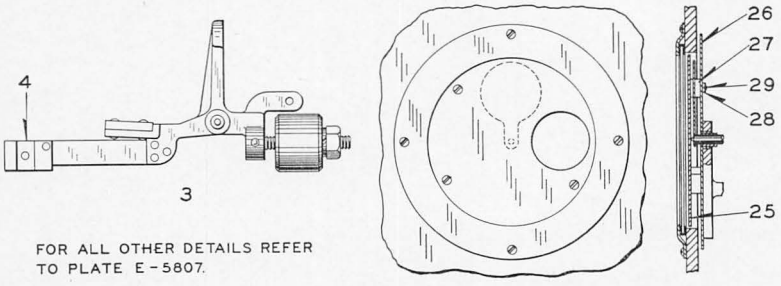
(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
136337	**18**	**Up and Down Rod**	B–7725–78
173965	**19**	**Up and Down Rod**	B–7725–95
43586	**20**	**Plunger**	C–8118–3
136611	**21**	**Plunger** Complete with Weight, Collar and Rivet	C–8118–7
174166	**22**	**Plunger** Complete	C–8118–11
43645	**23**	**Bushing** with $\frac{1}{8}$″x1$\frac{1}{2}$″ S. Cotter	8072–373
	24	**Pipe Nipple** Ref. 24a with Nut Ref. 24b	B–10375–6
233618	**24a**	**Pipe Nipple Only**	B–10375–6
233619	**24b**	**Nut**	8265–385
	25	**Tap Bolt,** $\frac{1}{2}$″x1$\frac{1}{2}$″ Hex. Hd. S. with $\frac{1}{2}$″ Pl. S. Lock Washer ($\frac{11}{64}$″x$\frac{1}{8}$″) (Cad. Pl.).	
	26	**Set Screw,** $\frac{1}{2}$″x$\frac{3}{4}$″ Sq. Hd. Cup Point.	
	27	**Straight Lubricating Fitting,** $\frac{1}{4}$″ Pipe Thread (Ball Check).	
	28	**Machine Screw,** No. 10-30x$\frac{3}{4}$″ Rd. Hd. S. (Tin Pl.) for attaching Terminal Board to Lock Stand.	
	29	**Bolt,** Ref. 29a, with $\frac{1}{2}$″ S. Plate Washer (Cad. Pl.), $\frac{1}{8}$″x$\frac{7}{8}$″ S. Cotter (Cad. Pl.) and Washer Ref. 29b	8280–188
103527	**29a**	**Bolt Only**	8280–188
7309	**29b**	**Washer**	7826–12
	30	**Tap Bolt,** $\frac{3}{8}$″x$\frac{7}{8}$″ Hex. Hd. S. (Cad. Pl.).	
62222	**31**	**Washer** (.0375″ thick)	7826–180
33010	**31a**	**Washer** (.0625″ thick)	7826–89
178388	**32**	**Terminal Board Only**	9968–1074
29102	**33**	**Washer**	7828–139



NOTE: LOCK IS SHOWN WITH HANDLE IN THE MID POSITION.



FOR ALL OTHER DETAILS REFER TO PLATE E-5807.

ARRANGEMENT FOR DISC TYPE

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Semaphore Indicators

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Semaphore Indicators

All Switch Lock Mechanisms will be furnished as noted in Paragraph 8 of Plate E-5800 unless otherwise specified.

If Sealed Mechanical Emergency Release and Extra Push Button Circuit Controller as shown on Plate E-5817 are desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Case and Mechanism for Style "SL-6A" D.C. Electric Switch Lock Dwg. D-1591-10.

Piece	Ref.	Type of Indicator		Case with Doors and Fittings	
		Description	Ref.	Description	Ref. Plate E-5807
	A	90° Upper Quadrant Semaphore	18	Door may be closed before switch is returned to normal	2
	Aa	90° Upper Quadrant Semaphore	18	Door cannot be closed until switch is returned to normal and locked	2a
	***Ab**	90° Upper Quadrant Semaphore	18	Without	
	B	60° Lower Quadrant Semaphore	17	Door may be closed before switch is returned to normal	2
	Ba	60° Lower Quadrant Semaphore	17	Door cannot be closed until switch is returned to normal and locked	2a
	***Bb**	60° Lower Quadrant Semaphore	17	Without	
	Bc	90° Upper Quadrant Dumbbell Type	23	Door may be closed before switch is returned to normal	2
	Bd	90° Upper Quadrant Dumbbell Type	23	Door cannot be closed until switch is returned to normal and locked	2a
	***Be**	90° Upper Quadrant Dumbbell Type	23	Without	
	Bf	Disc Type	24	Door may be closed before switch is returned to normal	2
	Bg	Disc Type	24	Door cannot be closed until switch is returned to normal and locked	2a

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Semaphore Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Type of Indicator		Case with Doors and Fittings	
		Description	Ref.	Description	Ref. Plate E-5807
	*Bh	Disc Type	24	Without	
		*Mechanism only, interchangeable in cases originally provided with Style "SL-6" mechanisms.			

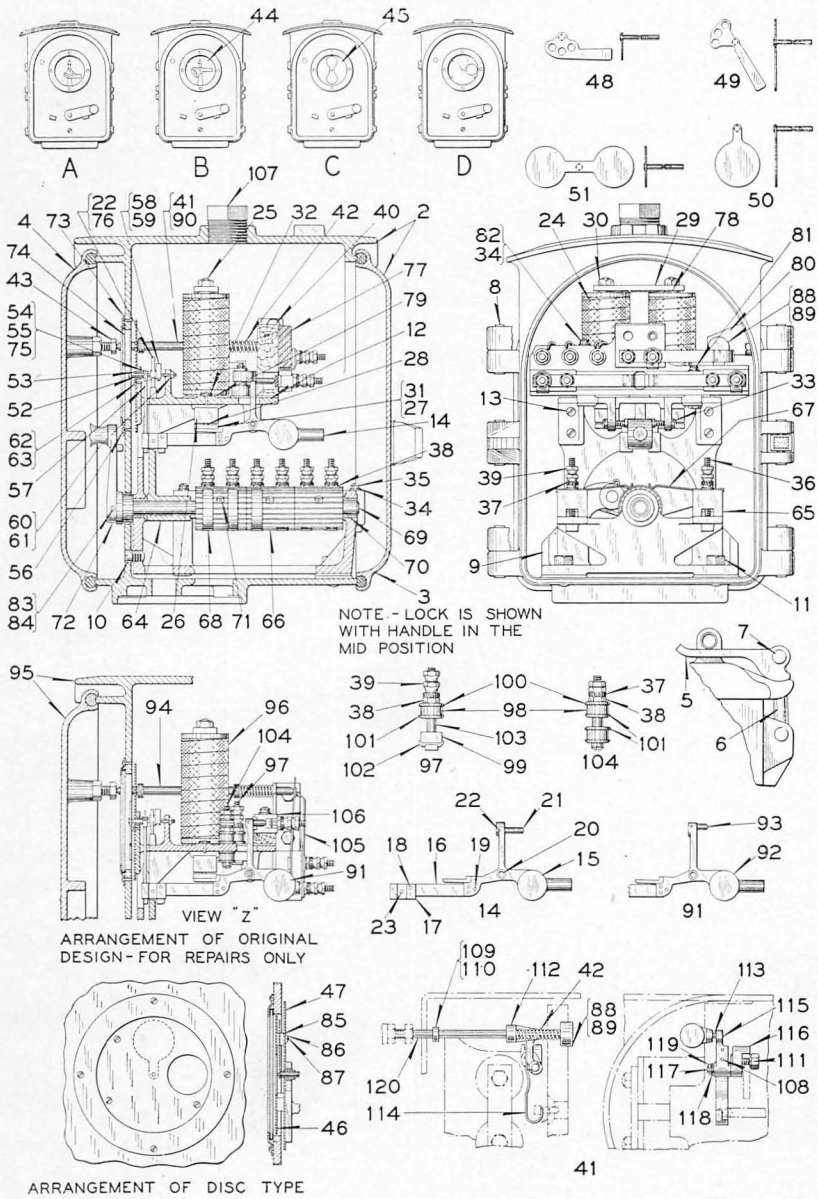
Piece	Ref.	Description	Drawing Reference
238704	2	**Magnet Support**	C–8118–23
238705	3	**Armature Bar Complete** (Inc. 1-4 of this Plate and 1-17, 1-18, 1-20, 1-21, 3-22, 1-23, 1-24, 1-25, 1-26, 1-30 and 4-34 of Plate E-5807)	8130–334
45801	4	**Lock Block**	8130–332
43653	5	**Bushing** (Pressed in Magnet Support)	C–7988–3
	6	**Machine Screw,** No. 6-40x¼″ Rd. Hd. Br. (N.P.)	
43649	7	**Link**	8232–81
54928	8	**Rivet**	10301–21
35797	9	**Glass Shield**	8163–102
35734	10	**Lens Ring**	7436–61
43648	11	**Sleeve.** For Semaphore Blade Shafts	8350–412
27015	12	**Screw**	8098–444
	13	**Pivot Screw** Ref. 13a with Nut Ref. 13b	8378–164
30419	13a	**Pivot Screw Only**	8378–164
26942	13b	**Nut**	8109–184
40919	14	**Pin**	8097–311
43673	15	**Face Plate** for Semaphore Type Indicator	10262–53
193504	15a	**Face Plate** for Dumbbell Type Indicator	10262–90

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Semaphore Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
45798	**16**	**Crank** for 60° L.Q. Indicator	8233–70
45799	**16a**	**Crank** for 90° U.Q. Indicator	8233–70
86513	**17**	**Semaphore Blade Complete** (Lower Quadrant)	8294–40
72191	**18**	**Semaphore Blade Complete** (Upper Quadrant)	8294–40
52469	**19**	**Stop Arm** for L.Q. Indicator	8192–245
52472	**19a**	**Stop Arm** for U.Q. Indicator	8192–246
12658	**20**	**Counterweight** for L.Q. Indicator	9672–8
45564	**20a**	**Counterweight** for U.Q. Indicator	9672–8
	21	**Machine Screw**, No. 4-48x¼″ Fil. Hd. Br. (N.P.) for Crank.	
	22	**Machine Screw**, No. 6-40x¼″ Flat Hd. Br. (N.P.) for attaching Face Plate to Magnet Support.	
193506	**23**	**Dumbbell Type Indicator**	8234–52
152427	**24**	**Disc Complete**	8234–32
152426	**25**	**Front Face Plate** for Disc Type Indicator	10262–91
152425	**26**	**Rear Face Plate** for Disc Type Indicator	10262–90
36053	**27**	**Bushing**	8350–351
29351	**28**	**Nut**	8109–204
	29	**Machine Screw**, No. 4-48x⅜″ Flat Hd. Br. (N.P.).	
		For all other details refer to Plate E-5807.	



D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

All Switch Lock Mechanisms with Indicators will be furnished as noted in Paragraph 8 of Plate E-5800 unless otherwise specified.

If Sealed Mechanical Emergency Release and extra Push Button Circuit Controller as shown on Plate E-5817 are desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**D.C. Electric Switch Lock Mechanism with 90° Upper Quadrant Semaphore Indicator.** With Case Ref. 2 (permitting door to be closed before switch is returned to normal)	D–1591–3
	Aa	**D.C. Electric Switch Lock Mechanism with 90° Upper Quadrant Semaphore Indicator.** With Case Ref. 2a (switch must be returned to normal and locked before door can be closed)	D–1591–3
	B	**D.C. Electric Switch Lock Mechanism with 60° Lower Quadrant Semaphore Indicator.** With Case Ref. 2 (permitting door to be closed before switch is returned to normal)	D–1591–3
	Ba	**D.C. Electric Switch Lock Mechanism with 60° Lower Quadrant Semaphore Indicator.** With Case Ref. 2a (switch must be returned to normal and locked before door can be closed)	D–1591–3
	C	**D.C. Electric Switch Lock Mechanism with 90° Upper Quadrant Dumbbell Type Indicator.** With Case Ref. 2 (permitting door to be closed before switch is returned to normal)	D–1591–3
	Ca	**D.C. Electric Switch Lock Mechanism with 90° Upper Quadrant Dumbbell Type Indicator.** With Case Ref. 2a (switch must be returned to normal and locked before door can be closed)	D–1591–3
	D	**D.C. Electric Switch Lock Mechanism with Disc Indicator.** With Case Ref. 2 (permitting door to be closed before switch is returned to normal)	D–1591–3
	Da	**D.C. Electric Switch Lock Mechanism with Disc Indicator.** With Case Ref. 2a (switch must be returned to normal and locked before door can be closed)	D–1591–3
193492	2	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Middle to Full Reverse Positions (Inc. 1-2b, 1-3, 1-4, 2-5, 2-6, 4-7 and 4-8)	D–1591–4

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
211776	**2a**	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Normal to Full Reverse Positions (Inc. 1-2b, 1-3, 1-4a, 2-5, 2-6, 4-7 and 4-8)..	D–1591–4
193493	**2b**	**Case Only**.....	C–8118–2
72192	**3**	**Rear Door** with Gasket Ref. 3a.....	C–8118–2
	3a	**Packing,** $\frac{3}{8}$″x$\frac{3}{8}$″x3′-5-$\frac{1}{4}$″ long.	
72591	**4**	**Front Door** with Gasket Ref. 3a. Lug on Door extends from Middle to Full Reverse Positions...	C–8118–2
135549	**4a**	**Front Door** with Gasket Ref. 3a. Lug on Door extends from Normal to Full Reverse Positions...	C–8118–2
54955	**5**	**Hasp**.....	8299–62
46796	**6**	**Link**.....	C–8079–6
209198	**7**	**Pin**.....	B–10207–1
209199	**8**	**Pin**.....	B–10207–1
43576	**9**	**Lock Base**.....	C–8118–1
43646	**10**	**Stud**.....	8190–171
	11	**Tap Bolt,** $\frac{1}{2}$″x$\frac{7}{8}$″ Hex. Hd. S. (Cad. Pl.).	
43577	**12**	**Magnet Support**.....	C–8118–1
	13	**Machine Screw,** No. 14-24x$\frac{7}{8}$″ Fil. Hd. S. (Tin Pl.).	
170449	**14**	**Armature Bar Complete** (Inc. 1-15, 1-16, 1-17, 1-18, 3-19, 1-20, 1-21, 1-22 and 1-23).....	8130–267
168627	**15**	**Bar**.....	8130–267
45802	**16**	**Lock Bar**.....	8130–267
45801	**17**	**Lock Block**.....	8130–267
39374	**18**	**Pin**.....	8097–336
39440	**19**	**Pin**.....	8097–336

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
184557	**20**	**Shaft**	8160–193
168629	**21**	**Insulation**	8750–1155
54928	**22**	**Rivet**	10301–21
210650	**23**	**Pin**	8097–409
169660	***24**	**Coil** (125-Ohms)	8133–343
169041	***24a**	**Coil** (75-Ohms)	8133–343
169987	***24b**	**Coil** (250-Ohms)	8133–343
213580	***24c**	**Coil** (25-Ohms)	8133–343
		*Coils Refs. 24 to 24c inclusive must be used on D.C. Electric Switch Locks with Indicators having Push Button and Armature Contacts Refs. A to Ad of Plate E-5815.	
43633	**25**	**Magnet Core**	8101–178
43632	**26**	**Pole Piece**	8250–36
43631	**27**	**Armature**	8157–209
3911	**28**	**Pin**	8097–8
36530	**29**	**Back Strap**	8162–139
9175	**30**	**Nut**	8265–6
	31	**Machine Screw**, No. 12-28x$\frac{5}{16}$" Flat Hd. S. (Tin Pl.) For attaching Armature to Armature Bar.	
56633	**32**	**Washer**	8078–860
2233	**33**	**Trunnion**	8378–38
84	**34**	**Washer**	7828–6
	35	**Machine Screw**, No. 14-24x1½" Fil. Hd. Bz. (N. Pl.).	
	36	**Terminal Post** with Nuts and Washers (Inc. 1-36a, 2-37, 1-38 and 2-39)	12451–

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
130593	**36a**	**Terminal Post Only**	8094–1192
29102	**37**	**Washer**	7828–139
29103	**38**	**Nut**	8109–194
29101	**39**	**Nut**	8109–193
43778	**40**	**Bolt**	8098–592
182230	**41**	**Operating Rod (for Battery Saving Contact) and Armature Force Down Device Complete** as shown in full lines (Inc. 1-41a, 1-41b, 1-88, 1-89 and 1-111)	C–8118–12
182228	**41a**	**Spring Complete** (Inc. 2-108, 1-114, 1-115, 1-116, 1-117, 1-118 and 1-119)	C–8118–12
182229	**41b**	**Push Rod Complete** (Inc. 1-42, 1-109, 2-110, 1-112, 1-113 and 1-120)	C–8118–12
38695	**42**	**Spring**	8124–112
	43	**Tap Bolt,** ⅜″x1¼″ Hex. Hd. (Cad. Pl.) with ⅜″ Hex. Nut (Cad. Pl.).	
43673	**44**	**Face Plate** for Semaphore Blade Type Indicator	10262–53
193504	**45**	**Face Plate** for Dumbbell Type Indicator	10262–90
152426	**46**	**Front Face Plate** for Disc Type Indicator	10262–91
152425	**47**	**Rear Face Plate** for Disc Type Indicator	10262–90
72191	**48**	**Semaphore Blade Complete** (Upper Quadrant)	8294–40
86513	**49**	**Semaphore Blade Complete** (Lower Quadrant)	8294–40
152427	**50**	**Disc Complete**	8234–32
193506	**51**	**Dumbbell Type Indicator**	8234–52
43648	**52**	**Sleeve**	8350–412
43653	**53**	**Bushing**	C–7988–3
45799	**54**	**Crank** for 90° U.Q. Indicator	8233–70
45798	**54a**	**Crank** for 60° L.Q. Indicator	8233–70

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
40919	**55**	**Pin**	8097–311
	56	**Machine Screw,** No. 4-48x¼″ Rd. Hd. Br. (N.P.).	
43649	**57**	**Link**	8232–81
45564	**58**	**Counterweight** for U.Q. Indicator	9672–8
12658	**58a**	**Counterweight** for L.Q. Indicator	9672–8
27015	**59**	**Screw** for Counterweights	8098–444
30419	**60**	**Pivot Screw**	8378–164
26942	**61**	**Nut** for Pivot Screw	8109–184
	62	**Machine Screw,** No. 6-40x¼″ Flat Hd. Br. (N.P.) for attaching Face Plate to Magnet Support.	
	63	**Machine Screw,** No. 6-40x¼″ Rd. Hd. Br. (N.P.) for attaching Face Plate to Magnet Support.	
43575	**64**	**Locking Segment**	9916–28
43629	**65**	**Terminal Board** (Without Terminal Posts)	9968–229
43617	**66**	**Roller** (Without Bands)	8435–107
43639	**67**	**Contact Spring**	8385–1204
43640	**68**	**Contact Spring Band**	8385–1200
43582	**69**	**Shaft**	C–8118–2
43601	**70**	**Bushing**	8350–404
	71	**Machine Screw,** No. 10-30x½″ Fil. Hd. Br. (N.P.).	
43578	**72**	**Handle**	8311–119
35734	**73**	**Lens Ring**	7436–61
35797	**74**	**Glass Shield**	8163–102
	75	**Machine Screw,** No. 4-48x¼″ Fil. Hd. Br. (N.P.) for Crank.	

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
52472	**76**	**Stop Arm** for U.Q. Indicator	8192–246
52469	**76a**	**Stop Arm** for L.Q. Indicator	8192–245
	77	**Push Button (Battery Saving) and Armature Contacts Complete** (When ordering assemblies or details refer to Ref. A of Plate E-5815)	C–8118–9
184680	**78**	**Coil Lock**	8735–784
168826	**79**	**Washer**	8078–1499
168530	**80**	**Bracket**	10914–267
	81	**Machine Screw,** No. 14-24x1⅝″ Fil. Hd. S. (Tin Pl.).	
	82	**Machine Screw,** No. 14-24x2½″ Fil Hd. S. (Tin Pl.).	
40057	**83**	**Taper Pin**	8059–27
40058	**84**	**Nut**	8265–126
36053	**85**	**Bushing**	8350–351
29351	**86**	**Nut**	8109-204
	87	**Machine Screw,** No. 4-48x⅜″ Flat Hd. Br. (N.P.).	
168975	**88**	**Collar** (Insulation)	8750–2449
53570	**89**	**Pin**	8097–665
168631	**90**	**Operating Rod Complete** (For Battery Saving Contact) (Inc. 2-109, 2-110 and 1-20) for Indicators without Armature Force Down Device	C–8118–3
72190	**91**	**Armature Bar Complete** (For original design of Switch Indicator) (Inc. 1-16, 1-17, 1-18, 3-19, 1-21, 1-22, 1-23, 1-92 and 1-93)	8130–267
43574	**92**	**Bar**	8130–267
45694	**93**	**Insulation**	8750–1155
111256	**94**	**Operating Rod Complete** (For Battery Saving Contact) (Inc. 1-94a, 1-94b, 1-22, 2-109 and 2-110) (For original design of Switch Indicator)	C–8118–3

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

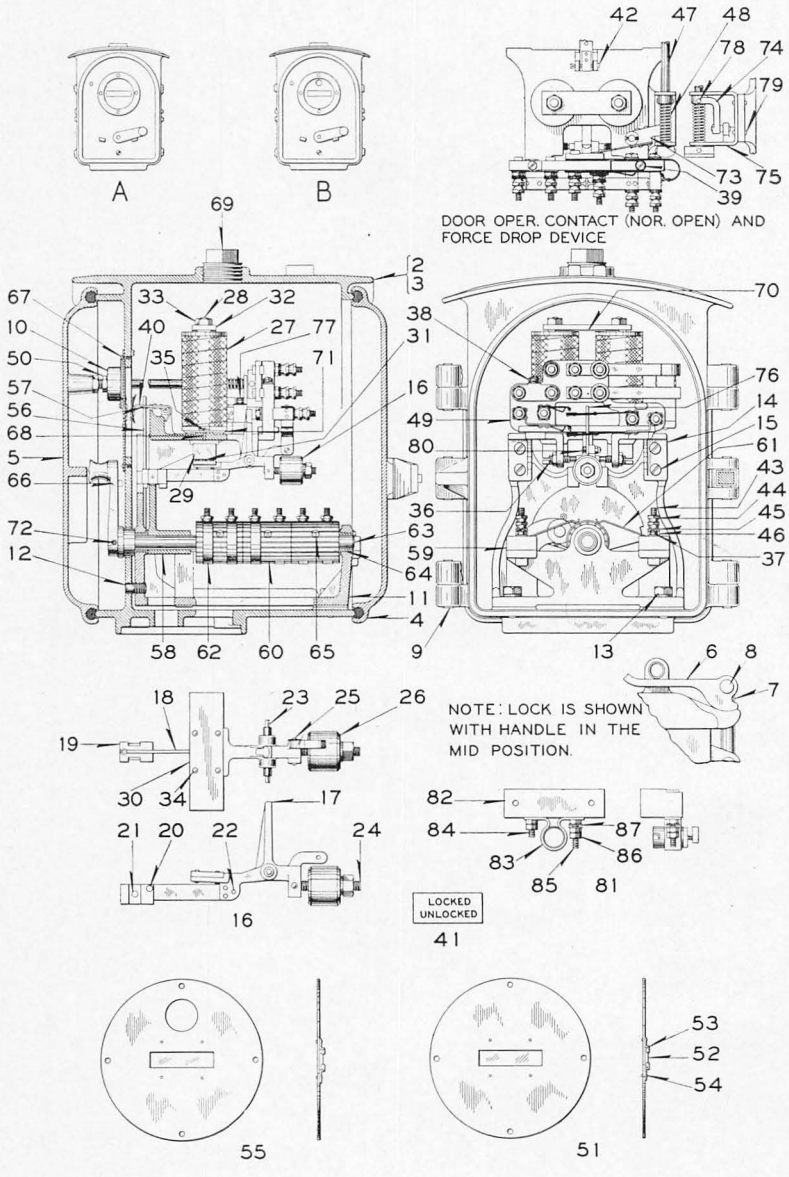
Piece	Ref.	Description	Drawing Reference
43585	**94a**	**Rod Only**	C–8118–3
43625	**94b**	**Insulation**	8750–1153
72193	**95**	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Middle to Full Reverse positions. (Inc. 1-95b, 1-3, 1-4, 2-5, 2-6, 4-7 and 4-8)	D–1591–1
135547	**95a**	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Normal to Full Reverse Positions (Inc. 1-95b, 1-3, 1-4a, 2-5, 2-6, 4-7 and 4-8)	D–1591–1
43579	**95b**	**Case Only**	C–8118–2
69244	**‡96**	**Coil** (125-Ohms)	8133–127
69152	**‡96a**	**Coil** (250-Ohms)	8133–127
81144	**‡96b**	**Coil** (50-Ohms)	8133–127
87583	**‡96c**	**Coil** (25-Ohms)	8133–127
69154	**‡96d**	**Coil** (500-Ohms)	8133–127
75643	**‡96e**	**Coil** (100-Ohms)	8133–127
94118	**‡96f**	**Coil** (75-Ohms)	8133–127
78925	**‡96g**	**Coil** (335-Ohms)	8133–127
		‡Coils Refs. 96 to 96g inclusive are for use with D.C. Electric Switch Locks with Indicators having Push Buttons and Armature Contacts Refs. B to F of Plate E-5815.	
	97	**Terminal Post** with Nuts, Washers and Insulations (Inc. 1-97a, 1-98, 1-99, 1-100, 1-101, 1-102, 1-103, 2-37, 1-38 and 2-39)	12451–
118271	**97a**	**Terminal Post Only**	8094–1192
33877	**98**	**Bushing**	8095–364
41047	**99**	**Insulation**	8750–1092
29105	**100**	**Washer**	7828–140

D. C. Electric Switch Lock Mechanisms with Semaphore and Disc Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
41105	**101**	**Washer**	7828–178
121616	**102**	**Lock Washer**	8486–362
81751	**103**	**Insulation**	B–10270–1
	104	**Machine Screw,** No. 14-24x2¼″ Fil. Hd. Bz. (N.P.) with Nuts, Washers and Insulations (Inc. 2-98, 2-100, 2-101, 1-103, 3-38 and 2-37)	12471–
	105	**Push Button Contact Complete** (Battery Saving) (When ordering assemblies or details refer to Reference B, C or D Plate E-5815)	C–8118–6
	106	**Armature Contact Complete** (When ordering assemblies or details refer to Reference E or F Plate E-5815)	C–8118–6
	107	**Pipe Plug,** 1¼″.	
54921	**108**	**Rivet**	10301–1
19901	**109**	**Collar**	8072–164
37789	**110**	**Pin**	8097–279
	111	**Tap Bolt,** $\frac{5}{16}$″x¾″ Hex. Hd. S. (Cad. Pl.) with $\frac{5}{16}$″ Pl. S. Lock Washer ($\frac{5}{32}$″x$\frac{3}{32}$″) (Cad. Pl.).	
182222	**112**	**Push Rod Arm**	C–8118–12
111781	**113**	**Stud**	8114–585
182247	**114**	**Spring**	8735–779
182220	**115**	**Spring Arm**	C–8118–12
182221	**116**	**Spring Arm Support**	C–8118–12
182231	**117**	**Stud**	8114–669
116360	**118**	**Washer**	7828–184
	119	**Cotter,** ⅛″x¾″ S. (Tin Pl.).	
168630	**120**	**Push Rod**	C–8118–3



Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

All Switch Lock Mechanisms will be furnished as noted in Paragraph 8 of Plate E-5800 unless otherwise specified.
If Sealed Mechanical Emergency Release and extra Push Button Circuit Controller as shown on Plate E-5817 are desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Case and Mechanism for Style "SL-6A" D.C. Electric Switch Lock Dwg. D-1591-8

Piece	Ref.	Type of Indicator	Case with Doors and Fittings	
			Description	Ref.
	A	Locked and Unlocked Type (Non-illuminated)	Door may be closed before switch is returned to normal	2
	Aa	Locked and Unlocked Type (Non-illuminated)	Door cannot be closed until switch is returned to normal and locked	2a
	B	Locked and Unlocked Type (Illuminated)	Door may be closed before switch is returned to normal	3
	Ba	Locked and Unlocked Type (Illuminated)	Door cannot be closed until switch is returned to normal and locked	3a
	***Bb**	Locked and Unlocked Type (Suitable for either Non-illuminated or Illuminated Indicators)	Without	
		*Mechanism only, interchangeable in cases originally provided with Style "SL-6" Mechanisms.		

Piece	Ref.	Description	Drawing Reference
	2	**Case with Doors and Fittings.** For Mechanism with Non-Illuminated Indicator and Mechanism with Semaphore Indicator. Lever Lug on Front Door extends from Middle to Full Reverse Positions; permitting door to be closed before switch is returned to normal (Inc. 1-2b, 1-4, 1-5, 2-6, 2-7, 4-8, 4-9 and 1-10)	C–8118–24
239022	**2a**	**Case with Doors and Fittings.** For Mechanism with Non-Illuminated Indicator and Mechanism with Semaphore Indicator. Lever Lug on Front Door extends from Normal to Full Reverse positions; switch must be returned to normal and locked before door can be closed (Inc. 1-2b, 1-4, 1-5a, 2-6, 2-7, 4-8, 4-9 and 1-10)	C–8118–24

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
111266	**2b**	**Case only** for Refs. 2 and 2a	C–8118–13
	3	**Case with Doors and Fittings.** For Mechanism with Illuminated Indicator. Lever Lug on Front Door extends from Middle to Full Reverse positions permitting door to be closed before switch is returned to normal (Inc. 1-3b, 1-4, 1-5, 2-6, 2-7, 4-8, 4-9 and 1-10)	C–8118–24
	3a	**Case with Doors and Fittings.** For Mechanism with Illuminated Indicator. Lever Lug on Front Door extends from Normal to Full Reverse positions; switch must be returned to normal and locked before door can be closed (Inc. 1-3b, 1-4, 1-5a, 2-6, 2-7, 4-8, 4-9 and 1-10)	C–8118–24
	3b	**Case only** for Refs. 3 and 3a	C–8118–13
72192	**4**	**Rear Door** with Gasket Ref. 4a	C–8118–2
	4a	**Packing,** $\frac{3}{8}$″x$\frac{3}{8}$″x3′-5$\frac{1}{4}$″ long.	
72591	**5**	**Front Door** with Gasket Ref. 4a. Lug on Door extends from Middle to Full Reverse Positions; permitting door to be closed before switch is returned to normal	C–8118–2
135549	**5a**	**Front Door** with Gasket Ref. 4a. Lug on Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed	C–8118–2
54955	**6**	**Hasp**	8299–62
46796	**7**	**Link**	C–8079–6
209198	**8**	**Pin**	B–10207–1
209199	**9**	**Pin**	B–10207–1
182581	**10**	**Flexible Cover Complete** to prevent the formation of ice on end of Operating Rod (For Door Operated Contact) (Inc. 1-10a, 1-10c and 3-10d)	C–8118–12
182580	**10a**	**Flexible Cover** with Plug Ref. 10b	8078–1560
182579	**10b**	**Plug**	8072–767

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
182578	**10c**	**Retainer Ring**	7826–293
	10d	**Machine Screw,** No. 6-40x½″ Rd. Hd. Br. (N.P.).	
43576	**11**	**Lock Base**	C–8118–1
43646	**12**	**Stud**	8190–171
	13	**Tap Bolt,** ½″x1″ Hex. Hd. S. (Cad. Pl.) with ½″ Pl. S. Lock Washer ($\frac{11}{64}$″x⅛″) (Cad. Pl.).	
236220	**14**	**Magnet Support**	C–8118–21
	15	**Machine Screw,** No. 14-24x1″ Fil. Hd. S. (Tin Pl.) with ¼″ Pl. S. Lock Washer ($\frac{3}{32}$″x$\frac{1}{16}$″) (Tin Pl.).	
236218	**16**	**Armature Bar Complete** (Inc. 1-17, 1-18, 1-19, 1-20, 1-21, 3-22, 1-23, 1-24, 1-25, 1-26, 1-30 and 1-34)	8130–334
236211	**17**	**Bar**	8130–333
45802	**18**	**Lock Bar**	8130–332
50296	**19**	**Lock Block**	8130–270
39374	**20**	**Pin**	8097–336
210650	**21**	**Pin**	8097–409
39440	**22**	**Pin**	8097–336
148211	**23**	**Shaft**	8160–192
	24	**Stud** Ref. 24a with $\frac{5}{16}$″-18 Hex. Nut (Tin Pl.) and $\frac{5}{16}$″ Pl. S. Lock Washer ($\frac{5}{32}$″x$\frac{3}{32}$″) (Tin Pl.)	8114–1003
233678	**24a**	**Stud only**	8114–1003
36707	**25**	**Pin**	8097–279
233679	**26**	**Counterweight**	9672–233
169660	**27**	**Coil** (125-Ohms)	8133–343
169041	**27a**	**Coil** (75-Ohms)	8133–343

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
169987	**27b**	**Coil** (250-Ohms)	8133–343
213580	**27c**	**Coil** (25-Ohms)	8133–343
244016	**27d**	**Coil** (100-Ohms)	8133–343
43633	**28**	**Magnet Core**	8101–178
43632	**29**	**Pole Piece**	8250–36
43631	**30**	**Armature**	8157–209
63106	**31**	**Pin**	8097–973
36530	**32**	**Back Strap**	8162–139
9175	**33**	**Nut**	8265–6
54933	**34**	**Rivet** for attaching Armature to Armature Bar	10301–30
56633	**35**	**Washer**	8078–860
	36	**Screw** Ref. 36a with Nut Ref. 36b	8378–189
57995	**36a**	**Screw only**	8378–189
29577	**36b**	**Nut**	8109–205
	37	**Machine Screw,** No. 14-24x1″ Fil. Hd. Bz. (Tin Pl.) with Washer Ref. 37a and ¼″ Pl. S. Lock Washer ($\frac{3}{32}$″x$\frac{1}{16}$″) (Tin Pl.).	
84	**37a**	**Washer**	7828–6
	38	**Machine Screw,** No. 14-24x2½″ Fil. Hd. S. (Tin Pl.) with Washer Ref. 38a and ¼″ Pl. S. Lock Washer ($\frac{3}{32}$″x$\frac{1}{16}$″) (Tin Pl.).	
18757	**38a**	**Washer**	7828–104
	39	**Machine Screw,** No. 14-24x1⅜″ Fil. Hd. S. (Tin Pl.) with Washer Ref. 38a and ¼″ Pl. S. Lock Washer ($\frac{3}{32}$″x$\frac{1}{16}$″) (Tin Pl.).	
168209	**40**	**Indicator Arm Complete** (Without Indicator Card)	8335–31

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
135042	**41**	**Indicator Card** (Lettered "Locked" and "Unlocked"; word "Locked" being red on white background and "Unlocked" being black on white background)	12595–3
145011	**42**	**Pin**	8097–1038
	43	**Terminal Post with Nuts and Washers** (Inc. 1-43a, 2-44, 3-45, and 1-46)	12451–
160475	**43a**	**Terminal Post Only**	8094–2207
29101	**44**	**Nut**	8109–193
29102	**45**	**Washer**	7828–139
29103	**46**	**Nut**	8109–194
236293	**47**	**Push Rod Complete** (For Door-Operated Contact) (Inc. 1-47a, 1-47b, 1-47c and 1-47d)	12501–167
236292	**47a**	**Push Rod Only**	12501–167
236223	**47b**	**Button**	8750–3118
65601	**47c**	**Rivet** for attaching Button to Push Rod	10301–50
207602	**47d**	**Washer** used with Rivet Rev. 47c	7826–300
38695	**48**	**Spring**	8124–112
	49	**Door-Operated and Armature Contacts Complete** (When ordering assemblies or details refer to Plate E-5814)	C–8118–20
	50	**Tap Bolt,** ⅜″-16x1″ Hex. Hd. S. (Cad. Pl.) with ⅜″ Hex. Jam Nut (Cad. Pl.).	
168722	**51**	**Face Plate Complete** (Inc. 1-51a, 1-52, 6-53 and 6-54) (For Non-Illuminated Indicators)	10262–94
168531	**51a**	**Front Plate Only**	10262–93
168196	**52**	**Glass Shield** for Refs. 51 and 55	8163–307
168185	**53**	**Clip**	11893–549

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
37417	**54**	**Rivet**	10301–21
179680	**55**	**Face Plate Complete** (Inc. 1-55a, 1-52, 6-53 and 6-54) (For Illuminated Indicators)	10262–97
179679	**55a**	**Face Plate Only**	10262–96
197420	**56**	**Operating Rod**	8097–559
45193	**57**	**Washer**	7828–184
43575	**58**	**Locking Segment**	9916–28
233014	**59**	**Terminal Board**	9968–1305
43617	**60**	**Roller**	8435–107
233013	**61**	**Contact Spring**	8385–2743
43640	**62**	**Contact Spring Band**	8385–1200
43582	**63**	**Shaft**	8160–201
43601	**64**	**Bushing**	8350–404
	65	**Machine Screw,** No. 10-30x$\frac{1}{2}$" Fil. Hd. Br. (N.P.)	
43578	**66**	**Handle**	8311–119
	67	**Machine Screw,** No. 4-48x$\frac{1}{4}$" Rd. Hd. Br. (N.P.)	
54928	**68**	**Rivet**	10301–21
	69	**Pipe Plug,** 1$\frac{1}{4}$" C. I.	
184680	**70**	**Coil Lock**	8735–784
168826	**71**	**Washer**	8078–1499
	72	**Taper Pin** Ref. 72a with Nut Ref. 72b and No. 10 Pl. S. Lock Washer ($\frac{1}{16}$"x$\frac{3}{64}$") (Tin Pl.)	8059–27
40057	**72a**	**Taper Pin Only**	8059–27
40058	**72b**	**Nut**	8265–126
236295	**73**	**Spring Arm Complete** (Inc. 1-73a, 1-73b, 1-73c and 2-73d)	C–8118–22

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

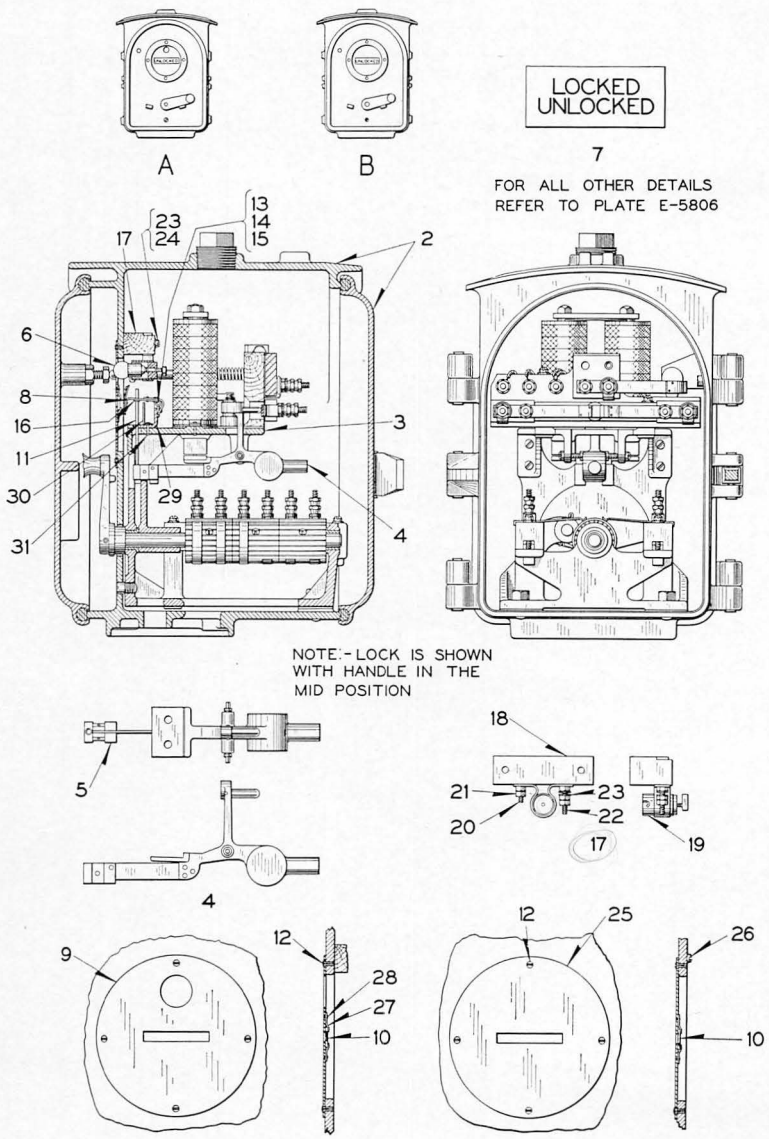
Piece	Ref.	Description	Drawing Reference
236294	73a	**Spring Arm Only**	C–8118–22
236221	73b	**Force Down Spring**	8735–1017
236222	73c	**Reinforcing Spring**	8735–1017
54922	73d	**Rivet**	10301–1
236297	74	**Push Rod Arm** with Stud Ref. 74b	C–8118–2
236296	74a	**Push Rod Arm Only**	C–8118–2
111781	74b	**Stud**	8114–585
236219	75	**Bracket**	10914–1477
235886	76	**Insulation**	8750–3115
	77	**Stud** Ref. 77a with Washer Ref. 77b and $\frac{1}{8}$"x$\frac{3}{4}$" S. Cotter (Tin Pl.)	8114–669
146676	77a	**Stud Only**	8114–669
116360	77b	**Washer**	7828–184
37789	78	**Pin**	8097–279
	79	**Rivet,** $\frac{3}{16}$"x$\frac{1}{2}$" Rd. Hd. I.	
	80	**Screw** Ref. 80a with No. 6-32 Stop Nut	8098–1470
236316	80a	**Screw Only**	8098–1470
168210	81	**Lamp Socket Complete** for Illuminated Indicator	9968–1018
168187	82	**Terminal Board**	9968–1010
94185	83	**Bayonet Lamp Socket Complete** with Mounting Strap	12415–44
	84	**Terminal Post Complete** (Inc. 1-84a and 2-86)	12451–
60526	84a	**Terminal Post Only**	8094–1039
	85	**Terminal Post Complete** (Inc. 1-85a, 3-86 and 2-87)	12451–

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
98901	85a	**Terminal Post Only**	8094–1039
26942	86	**Nut**	8109–184
44618	87	**Washer**	7828–184
	88	**Machine Screw,** No. 10-30x1⅝" Fil. Hd. S. (Tin Pl.) with Washer Ref. 87. For attaching Lamp Socket Ref. 81 to Case (Not shown).	
120270	89	**Lamp** (12-16 Volts) (Not shown)	12409–4



D. C. Electric Switch Lock Mechanisms with Illuminated and Non-Illuminated Indicators

D. C. Electric Switch Lock Mechanisms with Illuminated and Non-Illuminated Indicators

All Switch Lock Mechanisms with Indicators will be furnished as noted in Paragraph 8 of Plate E-5800 unless otherwise specified.

If Sealed Mechanical Emergency Release and extra Push Button Circuit Controller as shown on Plate E-5817 are desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**D.C. Electric Switch Lock Mechanism with Illuminated Indicator.** With Case Ref. 2 (permitting door to be closed before switch is returned to normal)	D–1591–3
	Aa	**D.C. Electric Switch Lock Mechanism with Illuminated Indicator.** With Case Ref. 2a (switch must be returned to normal and locked before door can be closed)	D–1591–3
	B	**D.C. Electric Switch Lock Mechanism with Non-Illuminated Indicator.** With Case Ref. 2 (permitting door to be closed before switch is returned to normal)	D–1591–3
	Ba	**D.C. Electric Switch Lock Mechanism with Non-Illuminated Indicator.** With Case Ref. 2a (switch must be returned to normal and locked before door can be closed)	D–1591–3
167810	2	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Middle to Full Reverse positions (Inc. 1-2b of this Plate and 1-3, 1-4, 2-5, 2-6, 4-7 and 4-8 of Plate E-5806)	D–1591–4
173727	2a	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Normal to Full Reverse positions (Inc. 1-2b of this Plate and 1-3, 1-4a, 2-5, 2-6, 4-7 and 4-8 of Plate E-5806)	D–1591–5
168207	2b	**Case Only**	C–8118–2
168206	3	**Magnet Support Complete** (Inc. 1-3a, 1-29, 1-30 and 2-31)	C–8118–1
168205	3a	**Magnet Support Only**	C–8118–1
104130	4	**Armature Bar Complete** (Inc. 1-5 of this Plate and 1-15, 1-16, 1-18, 3-19, 1-20, 1-21, 1-22 and 1-23 of Plate E-5806)	8130–328
50296	5	**Lock Block**	8130–270
120270	6	**Lamp** (12-16 Volts)	B–12409–11

D. C. Electric Switch Lock Mechanisms with Illuminated and Non-Illuminated Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

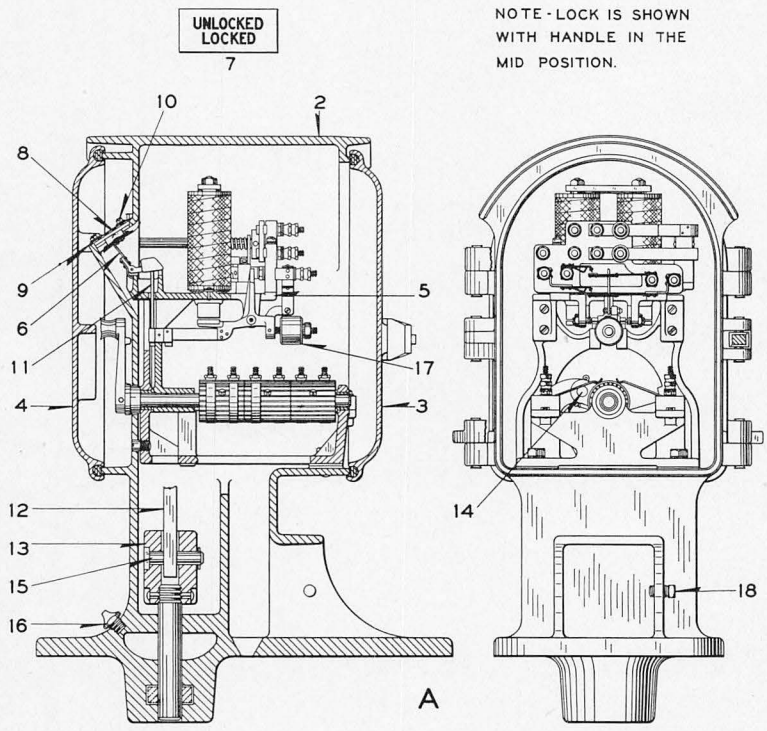
Piece	Ref.	Description	Drawing Reference
135042	7	**Indicator Card** (Lettered "Locked" and "Unlocked"; word "Locked" being red on white background and word "Unlocked" being black on white background)	12595–3
168209	8	**Indicator Arm Complete** (Without Indicator Card)	8335–31
179680	9	**Face Plate Complete** (Inc. 1-9a, 1-10, 6-27 and 6-28) (For Illuminated Indicator)	10262–97
179679	9a	**Face Plate Only**	10262–96
168196	10	**Glass Shield** for Refs. 9 and 25	8163–307
197420	11	**Operating Rod**	8097–559
	12	**Machine Screw,** No. 4-48x¼″ Rd. Hd. Br. (N.P.).	
168208	13	**Pin**	8097–409
168186	14	**Clip**	11893–550
	15	**Machine Screw,** No. 6-40x¼″ Fil. Hd. Br. (N.P.)	
45193	16	**Washer**	7828–184
168210	17	**Lamp Socket Complete**	9968–1018
168187	18	**Terminal Board**	9968–1010
94185	19	**Bayonet Lamp Socket**	12415–44
	20	**Terminal Post Complete** (Inc. 1-20a and 2-21)	12451–
60526	20a	**Terminal Post Only**	8094–1039
26942	21	**Nut**	8109–184
	22	**Terminal Post Complete** (Inc. 1-22a, 2-21 and 2-23)	12451–
98901	22a	**Terminal Post Only**	8094–1039
44618	23	**Washer**	7828–184
	24	**Machine Screw,** No. 10-30x1⅝″ Fil. Hd. S. (Tin Pl.).	

D. C. Electric Switch Lock Mechanisms with Illuminated and Non-Illuminated Indicators

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
168722	**25**	**Face Plate Complete** (Inc. 1-25a, 1-10, 6-27 and 6-28) (For Non-Illuminated Indicators)	10262–94
168531	**25a**	**Face Plate Only**	10262–93
	26	**Machine Screw,** No. 10-30x¼″ Fil. Hd. S. (Tin Pl.).	
168185	**27**	**Clip**	11893–549
37417	**28**	**Rivet**	10301–21
168192	**29**	**Bracket**	10914–261
104059	**30**	**Bracket**	10914–929
54937	**31**	**Rivet**	10301–50
		For all other details refer to Plate E-5806.	



FOR ALL OTHER DETAILS
REFER TO PLATE E-5807

Style "SL-6A" D. C. Electric Switch Lock For Installation Between Tracks

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators For Installation Between Tracks

All Switch Lock Mechanisms will be furnished as noted in Paragraph 8 of Plate E-5800 unless otherwise specified.
If Sealed Mechanical Emergency Release and Extra Push Button Circuit Controller as shown on Plate E-5817 are desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Style "SL-6A" D.C. Electric Switch Lock for Installation Between Tracks. Dwg. D-1591-9.

Piece	Ref.	Case with Doors and Fittings		Remarks
		Description	Ref.	
	A	Door may be closed before switch is returned to normal.	2	
	Aa	Door cannot be closed until switch is returned to normal and locked.	2a	
	Ab	Mechanism only, interchangeable in cases originally provided with Style "SL-6" Mechanisms.		

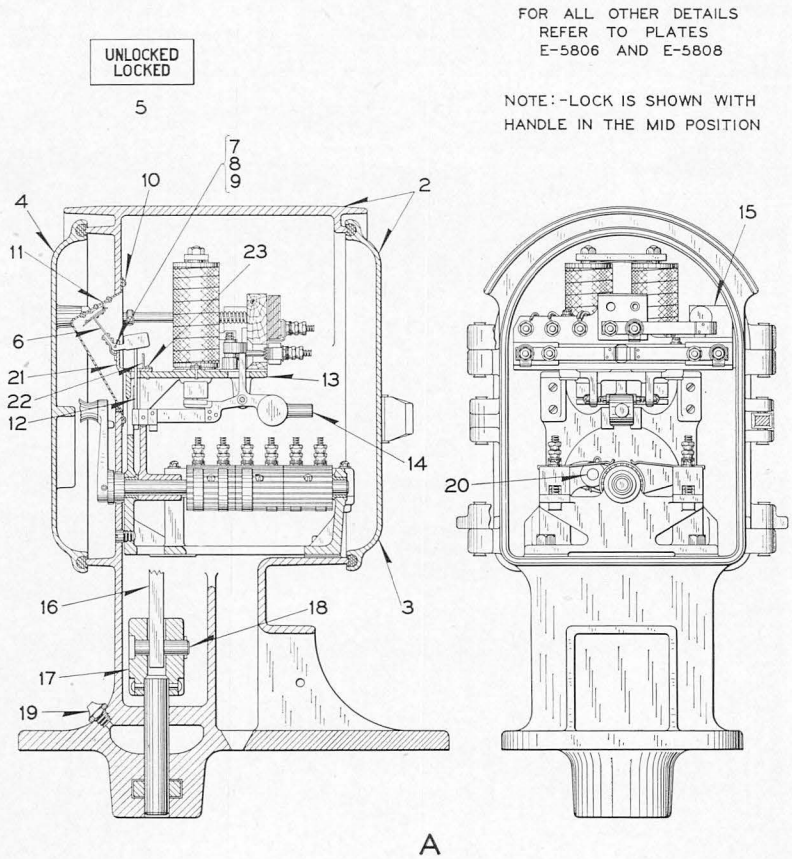
Piece	Ref.	Description	Drawing Reference
	2	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Middle to Full Reverse Positions permitting door to be closed before switch is returned to normal (Inc. 1-2b, 1-3, 1-4 and 1-18 of this Plate and 2-6, 2-7, 4-8, 4-9 and 1-10 of Plate E-5807)	D–1591–9A
	2a	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed (Inc. 1-2b, 1-3, 1-4a and 1-18 of this Plate and 2-6, 2-7, 4-8, 4-9 and 1-10 of Plate E-5807)	D–1591–9A
	2b	**Case Only**	C–8118–10
173947	3	**Rear Door** with Gasket Ref. 4a of Plate E-5807	C–8118–11
173946	4	**Front Door** with Gasket Ref. 4a of Plate E-5807. Lug on Door extends from Middle to full Reverse Positions permitting door to be closed before switch is returned to normal	C–8118–11

Style "SL-6A" D. C. Electric Switch Lock Mechanisms with Locked and Unlocked Type of Indicators For Installation Between Tracks

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
226193	**4a**	**Front Door** with Gasket Ref. 4a of Plate E-5807. Lug on Door extends from Normal to full Reverse Positions; switch must be returned to normal and locked before door can be closed	C–8118–11
236398	**5**	**Magnet Support**	C–8118–21
174033	**6**	**Indicator Arm Complete** (Without Indicator Card)	8335–33
174236	**7**	**Indicator Card** (Lettered "Locked" and "Unlocked"; word "Locked" being red on white background and word "Unlocked" being black on white background)	12595–20
242568	**8**	**Glass Shield**	8163–345
242569	**9**	**Cover**	11893–1020
	10	**Machine Screw,** No. 10-30x$\frac{3}{8}$" Fil. Hd. S. (Tin Pl.) with No. 10 Pl. S. Lock Washer ($\frac{1}{16}$"x$\frac{3}{64}$") (Tin Pl.)	
168194	**11**	**Operating Rod**	8097–416
173965	**12**	**Up and Down Rod**	B–7725–95
174166	**13**	**Plunger Complete**	C–8118–11
	14	**Bushing** Ref. 14a with $\frac{1}{8}$"x1$\frac{1}{2}$" S. Cotter (Tin Pl.)	8072–373
43645	**14a**	**Bushing Only**	8072–373
	15	**Pin** Ref. 15a with $\frac{3}{16}$"x1$\frac{1}{8}$" S. Cotter (Tin Pl.)	B–10218–1
11680	**15a**	**Pin Only**	B–10218–1
	16	**Lubricating Fitting,** Push Type, $\frac{1}{4}$" Pipe Thread.	
236218	**17**	**Armature Bar Complete** (See reference 16 of Plate E-5807 for details)	8130–334
	18	**Set Screw,** $\frac{1}{2}$"x$\frac{3}{4}$" Sq. Hd. Cup Point.	
		For all other details refer to Plate E-5807.	



D. C. Electric Switch Locks with Indicators for Installation Between Tracks

D. C. Electric Switch Locks with Indicators for Installation Between Tracks

All Switch Locks with Indicators will be furnished as noted in Paragraph 8 of Plate E-5800 unless otherwise specified.

If Sealed Mechanical Emergency Release and extra Push Button Circuit Controller as shown on Plate E-5817 are desired orders should so state.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

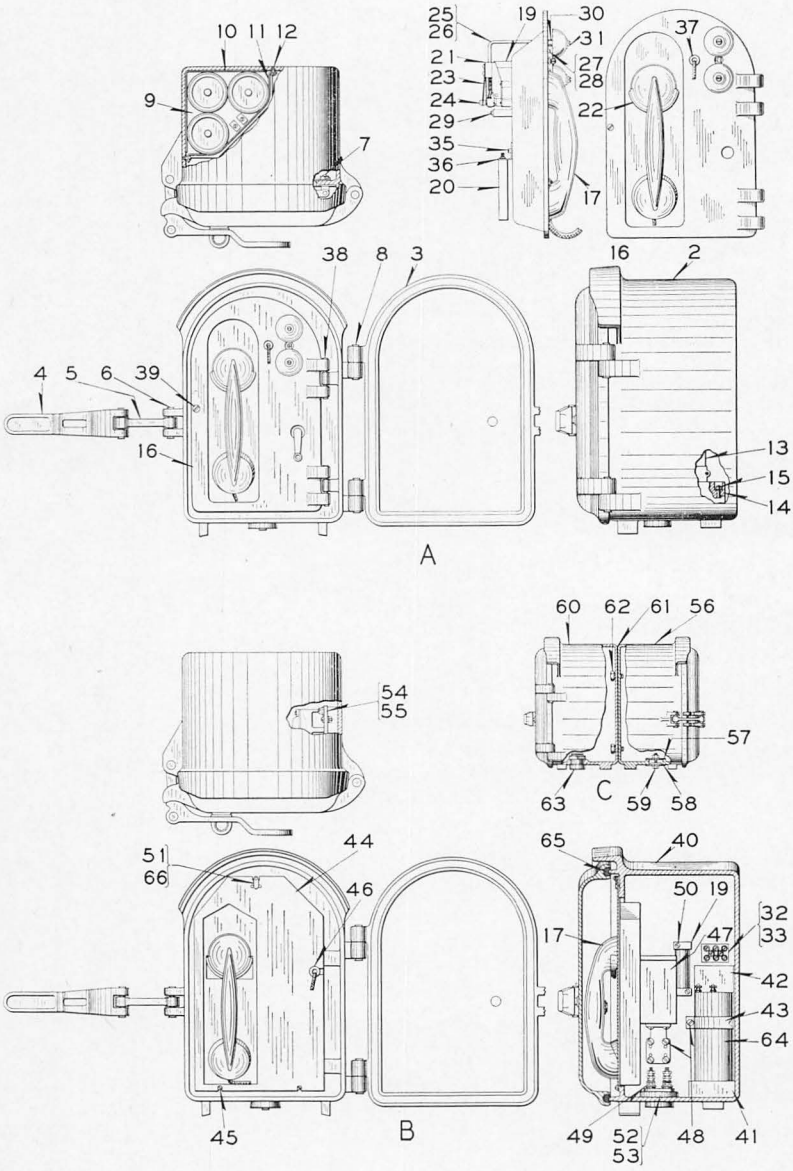
Piece	Ref.	Description	Drawing Reference
	A	**D.C. Electric Switch Lock with Indicator.** With Case Ref. 2 (permitting door to be closed before switch is returned to normal)	D–1591–7
	Aa	**D.C. Electric Switch Lock with Indicator.** With Case Ref. 2a (switch must be returned to normal and locked before door can be closed)	D–1591–7
174247	2	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Middle to Full Reverse Positions (Inc. 1-2b, 1-3 and 1-4 of this Plate and 2-5, 2-6, 4-7 and 4-8 of Plate E-5806)	D–1591–6
	2a	**Case with Doors and Fittings.** Lever Lug on Front Door extends from Normal to Full Reverse Positions (Inc. 1-2b, 1-3 and 1-4a of this Plate and 2-5, 2-6, 4-7 and 4-8 of Plate E-5806)	D–1591–6
173934	2b	**Case Only**	C–8118–10
173947	3	**Rear Door** with Gasket Ref. 3a of Plate E-5806	C–8118–11
173946	4	**Front Door** with Gasket Ref. 3a of Plate E-5806. Lug on Door extends from Middle to Full Reverse Positions	C–8118–11
	4a	**Front Door** with Gasket Ref. 3a of Plate E-5806. Lug on Door extends from Normal to Full Reverse Positions	C–8118–11
174236	5	**Indicator Card** (Lettered "Locked" and "Unlocked"; word "Locked" being red on white background and word "Unlocked" being black on white background)	12595–20
174033	6	**Indicator Arm Complete** (Without Indicator Card)	8335–33
168208	7	**Pin**	8097–409
168186	8	**Clip**	11893–550
	9	**Machine Screw,** No. 6-40x¼" Fil Hd. Br. (N.P.).	
	10	**Machine Screw,** No. 8-36x¼" Fil. Hd. S. (Tin Pl.).	

D. C. Electric Switch Locks with Indicators for Installation Between Tracks

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
174067	**11**	**Face Plate Complete** (Inc. 1-11a of this Plate and 1-10, 6-27 and 6-28 of Plate E-5808)	10262–95
174066	**11a**	**Face Plate Only**	10262–95
168194	**12**	**Operating Rod**	8097–416
174045	**13**	**Magnet Support Complete** (Inc. 1-13a, 1-21, 1-22 and 2-23)	C–8118–1
168205	**13a**	**Magnet Support Only**	C–8118–1
104130	**14**	**Armature Bar Complete** (Inc. 1-5 of Plate E-5808 and 1-15, 1-16, 1-18, 3-19, 1-20, 1-21, 1-22 and 1-23 of Plate E-5806)	8130–328
174113	**15**	**Bracket**	10914–359
173965	**16**	**Up and Down Rod**	B–7725–95
174166	**17**	**Plunger Complete**	C–8118–11
	18	**Pin,** Ref. 18a, with $\frac{3}{16}$″x1$\frac{1}{8}$″ S. Cotter (Tin Pl.)	B–10218–1
11680	**18a**	**Pin Only**	B–10218–1
	19	**Lubricating Fitting,** Push Type, ¼″ Pipe Thread.	
	20	**Bushing,** Ref. 20a, with ⅛″x1½″ S. Cotter (Tin Pl.)	8072–373
43645	**20a**	**Bushing Only**	8072–373
174044	**21**	**Bracket**	10914–358
104060	**22**	**Bracket**	10914–930
54937	**23**	**Rivet**	10301–50
		For all other details refer to Plates E-5806 and E-5808.	



Telephones, for Applying to Style "SL-6A" D. C. Electric Switch Locks

D. C. Electric Switch Lock with Indicator

Detail Parts

Telephones

All telephone sets are furnished complete with three No. 6—1½ volt dry cells, Ref. 64.
Telephone Sets do not include Pipe Nipple Ref. 63 for attaching Case to Switch Lock; these, if desired, should be specified on orders.
See "Application Information for Telephone" in writeup preceding Plate E-5800.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
72187	**A**	**Telephone Set Complete** with Ringer and Generator for applying to Electric Switch Lock. For use where no C.T.C. Lines are involved	C–8638–2
152412	**Aa**	**Telephone Set Complete** with Ringer and without Generator for applying to Electric Switch Lock. For use where no C.T.C. Lines are involved	C–8638–2
234094	**B**	**Telephone Set Complete** with Filter Ref. 54 and without Generator and Ringer for applying to Electric Switch Lock. For use on C.T.C. Lines where carrier frequencies are involved	C–8638–3
240098	**Ba**	**Telephone Set Complete** with Filter Ref. 54a and without Generator and Ringer for applying to Electric Switch Lock. For use on C.T.C. Lines where no carrier frequencies are involved	C–8638–3
233051	**Bb**	**Telephone Set Complete** without Filter, Generator and Ringer for applying to Electric Switch Lock. For use on C.T.C. Lines	C–8638–3
177396	**C**	**Telephone Set Complete** with Ringer and Generator and with Extra Case for applying to Electric Switch Lock. For use where no C.T.C. Lines are involved	C–8117–6
72186	**2**	**Case Complete** for Ref. A. Arranged for Generator (Inc. 1-2b, 1-3, 1-4, 1-5, 2-6, 2-7 and 2-8)	C–8638–2
233046	**2a**	**Case Complete** for Ref. Aa. Not arranged for Generator (Inc. 1-2c, 1-3, 1-4, 1-5, 2-6, 2-7 and 2-8)	C–8638–2
44133	**2b**	**Case Only** for Ref. 2	C–8118–4
218574	**2c**	**Case Only** for Ref. 2a	C–8118–4
72185	**3**	**Door** with Gasket Ref. 65 and Staple	C–8118–4
54955	**4**	**Hasp**	8299–62
46796	**5**	**Link**	C–8079–6
209198	**6**	**Pin**	B–10207–1
	7	**Eye** Ref. 7a with Nut Ref. 7b and Lock Washer Ref. 7c	8191–61

D. C. Electric Switch Lock with Indicator

Detail Parts

Telephones

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
35270	**7a**	**Eye Only**	8191–61
1530	**7b**	**Nut**	8109–38
21438	**7c**	**Lock Washer**	8486–75
209199	**8**	**Hinge Pin**	B–10207–1
233006	**9**	**Battery Base**	12443–480
233004	**10**	**Insulation**	8750–3079
233005	**11**	**Battery Clamp**	10914–1382
	12	**Machine Screw,** No. 10-30x⅜″ Rd. Hd. Br. (Cop. Pl.).	
	13	**Generator.**	
233007	**14**	**Generator Base**	12443–481
	15	**Machine Screw,** No. 10-30x1⅞″ Fil. Hd. Br. (Copper Pl.) with Washer Ref. 15a.	
73129	**15a**	**Washer**	7828–180
224020	**16**	**Instrument Panel Complete** (Inc. 1-16a, 1-17, 1-18, 1-19, 1-20, 1-21, 1-22, 1-23, 1-24, 1-25, 2-26, 1-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 1-34, 3-35, 1-36 and 1-37)	C–16783–2
232978	**16a**	**Instrument Panel Only**	C–16783–10
	17	**Handset** with Retractile Cord.	
	19	**Induction Coil.**	
	20	**Condenser,** .25 Mfd.	
	21	**Hook Switch.**	
	22	**Hook Assembly.**	
	23	**Reinforcing Spring.**	
	24	**Insulation Separator.**	

D. C. Electric Switch Lock with Indicator

Detail Parts

Telephones

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
236925	**25**	**Ringer**	9954–91
	26	**Machine Screw,** No. 6-40x1/4″ Fil. Hd. S. (Tin Pl.) for attaching Ringer to Support.	
236926	**27**	**Support**	9999–1837
	28	**Machine Screw,** No. 8-36x1/2″ Fil. Hd. S. (Tin Pl.) for attaching Support to Instrument Panel.	
	29	**Machine Screw,** No. 8-36x1 1/4″ Fil. Hd. S. (Tin Pl.) for attaching Coil to Instrument Panel.	
236957	**30**	**Separator**	8072–254
	31	**Machine Screw,** No. 8-36x1 3/8″ Fil. Hd. S. (Tin Pl.) for attaching Gongs to Instrument Panel.	
	32	**Terminal Block Complete.**	
	33	**Machine Screw,** No. 8-36x5/8″ Fil. Hd. S. (Tin Pl.) for attaching Terminal Blocks to Instrument Panel.	
123519	**34**	**Wire Clip** (Not shown)	11893–203
	35	**Machine Screw,** No. 8-36x1/4″ Fil. Hd. S. (Tin Pl.) for attaching Wire Clip Ref. 34 and Bracket Ref. 36 to Instrument Panel.	
233721	**36**	**Bracket**	10914–1400
	37	**Grommet.**	
	38	**Hinge Pin,** 3/16″x2 1/2″ Rd. Hd. I.	
	39	**Machine Screw,** 1/4″-20x5/8″ Rd. Hd. Br. (Copper Pl.).	
234093	**40**	**Case Complete** for Refs. B and Ba. Arranged for mounting Filter (Inc. 1-40b, 1-3, 1-4, 1-5, 2-6 and 2-8)	C–8638–3
233722	**40a**	**Case Complete** for Ref. Bb. Not arranged for mounting Filter (Inc. 1-40c, 1-3, 1-4, 1-5, 2-6 and 2-8)	C–8638–3

D. C. Electric Switch Lock with Indicator

Detail Parts

Telephones

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
234092	**40b**	**Case Only** for Ref. 40	C–16783–4
233193	**40c**	**Case Only** for Ref. 40a	C–16783–4
233718	**41**	**Battery Base**	12443–483
233720	**42**	**Battery Insulation**	8750–3091
233719	**43**	**Battery Clamp**	10914–1399
233511	**44**	**Instrument Shield**	C–16783–8
	45	**Drive Screw,** No. 6x$\frac{3}{8}$″ (Tin Pl.).	
	46	**Grommet.**	
241690	**47**	**Handset Mounting Complete**	C–16783–11
	48	**Machine Screw,** No. 10-30x$\frac{7}{16}$″ Rd. Hd. Br. (Copper Pl.).	
142777	**49**	**Tag.** Orders should specify marking desired	8988–75
	50	**Machine Screw,** No. 8-36x1$\frac{1}{4}$″ Rd. Hd. Br. (Copper Pl.).	
20686	**51**	**Washer**	7828–108
221631	**52**	**Terminal Block** with Nuts and Washers (Without Tags)	9968–1100
	53	**Machine Screw,** No. 10-30x$\frac{9}{16}$″ Rd. Hd. Br. (Copper Pl.) for attaching Terminal Block to Case.	
234091	**54**	**Telephone Filter Complete** for Ref. B	C–16743–14
240099	**54a**	**Telephone Filter Complete** for Ref. Ba	C–16743–30
234396	**54b**	**Telephone Filter Complete.** Reactor type for use with Ref. Bb and Ref. 54c where carrier frequencies are involved and filters are to be located outside the telephone case	C–8025–42
231963	**54c**	**Telephone Filter Complete.** Capacitor type for use with Ref. Bb and Ref. 54b where carrier frequencies are involved and filters are to be located outside the telephone case	C–16743–12

D. C. Electric Switch Lock with Indicator

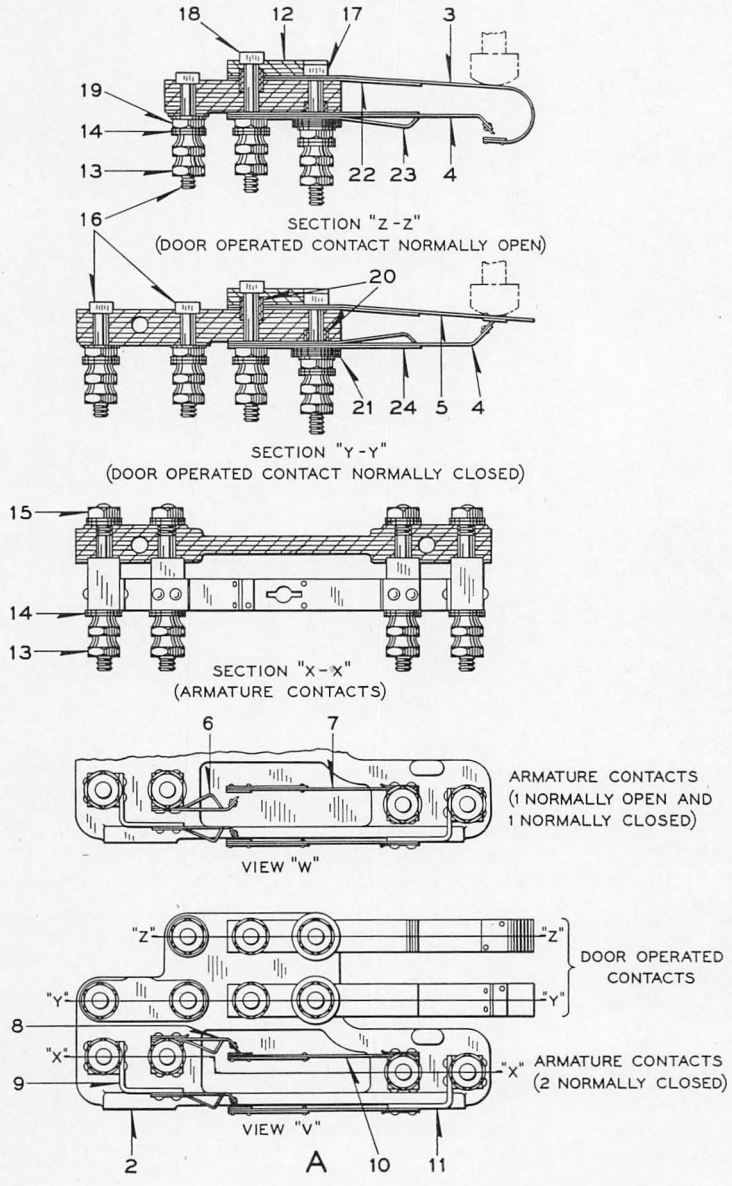
Detail Parts

Telephones

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
240128	**54d**	**Telephone Filter Complete.** Capacitor type for use with Ref. Bb where carrier frequencies are not involved and filter is to be located outside the telephone case	C–16743–31
	55	**Machine Screw,** No. 14-24x1¼″ Fil. Hd. S. with Spacer Ref. 55a, Washer Ref. 55b and ¼″ Pl. S. Lock Washer (3/32″x1/16″) (Tin Pl.).	
25371	**55a**	**Spacer**	B–10333–1
52178	**55b**	**Washer**	7826–117
177392	**56**	**Case Complete** for Ref. C. For housing Telephone. Arranged for Generator. (Inc. 1-56a, 1-3, 1-4, 1-5, 2-6, 2-7, 2-8, 1-57, 1-58 and 1-59)	C–8117–6
177389	**56a**	**Case Only** for Ref. 56	C–8118–4
177518	**57**	**Plate**	9999–952
177520	**58**	**Plate Complete**	9999–952
	59	**Bolt,** 3/8″x1 3/8″ Hex. Hd. S. with 3/8″ Hex. Nut.	
177394	**60**	**Extra Case Complete** for Ref. C (Inc. 1-60a, 1-3, 1-4, 1-5, 2-6 and 2-8)	C–8117–6
177388	**60a**	**Extra Case Only** for Ref. 60	C–8118–4
177393	**61**	**Gasket**	8078–1533
	62	**Tap Bolt,** ½″x¾″ Hex. Hd. S. with ½″ Pl. S. Lock Washer (3/16″x3/32″).	
	63	**Pipe Nipple** Ref. 63a with Nut Ref. 63b	B–10375–6
233618	**63a**	**Pipe Nipple Only**	B–10375–6
233619	**63b**	**Nut**	8265–385
	64	**Dry Cell,** 1½ Volts.	
	65	**Gasket,** 3/8″x3/8″x3′-8 3/8″ long Jute Packing.	
240872	**66**	**Clip**	11893–1010



Door-Operated and Armature Operated Contact Assembly

Style "SL-6A" D. C. Electric Switch Lock

Detail Parts

Door-Operated and Armature Operated Contact Assembly

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Door-Operated and Armature Contacts Complete Dwg. C8118-20.

Piece	Ref.	Door-Operated Contacts (Position when Door is Closed)	Armature Contacts (Position when Magnets are Deenergized)
237906	**A**	Two Normally Open	One Normally Open and One Normally Closed Per View "W"
236729	**Aa**	Two Normally Open	Two Normally Closed per View "V"
236014	**Ab**	One Normally Open and One Normally Closed	Two Normally Closed per View "V"
237631	**Ac**	Without	One Normally Open and One Normally Closed per View "W"
241052	**Ad**	One Normally Open and One Normally Closed	One Normally Open and One Normally Closed per View "W"

Piece	Ref.	Description	Drawing Reference
235887	**2**	**Terminal Board**	9968–1311
110554	**3**	**Contact Spring Complete**	8385–1385
72680	**4**	**Contact Spring Complete**	8385–846
72681	**5**	**Contact Spring Complete**	8385–847
	6	**Contact Spring Complete** with Nuts and Washers (Inc. 1-6a, 2-13, 3-14, 1-15 and one ¼" Pl. S. Lock Washer ($\frac{3}{32}$"x$\frac{1}{16}$") (Tin Pl.)	8385–2758
236001	**6a**	**Contact Spring Complete** (without Nuts and Washers)	8385–2758
	7	**Contact Spring Complete with Nuts and Washers** (Inc. 1-7a, 2-13, 3-14, 1-15 and one ¼" Pl. S. Lock Washer ($\frac{3}{32}$"x$\frac{1}{16}$") (Tin Pl.)	8385–2766
237646	**7a**	**Contact Spring Complete** (without Nuts and Washers)	8385–2766
	8	**Contact Spring Complete with Nuts and Washers** (Inc. 1-8a, 2-13, 3-14, 1-15 and one ¼" Pl. S. Lock Washer ($\frac{3}{32}$"x$\frac{1}{16}$") (Tin Pl.)	8385–2758

Style "SL-6A" D. C. Electric Switch Lock

Detail Parts

Door-Operated and Armature Operated Contact Assembly

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
236000	**8a**	**Contact Spring Complete** (without Nuts and Washers)	8385–2758
	9	**Contact Spring Complete with Nuts and Washers** (Inc. 1-9a, 2-13, 3-14, 1-15 and one ¼″ Pl. S. Lock Washer (3/32″x1/16″) (Tin Pl.)	8385–2760
236002	**9a**	**Contact Spring Complete** (without Nuts and Washers)	8385–2760
	10	**Contact Spring Complete with Nuts and Washers** (Inc. 1-10a, 2-13, 3-14, 1-15 and one ¼″ Pl. S. Lock Washer (3/32″x1/16″) (Tin Pl.)	8385–2755
235889	**10a**	**Contact Spring Complete** (without Nuts and Washers)	8385–2755
	11	**Contact Spring Complete with Nuts and Washers** (Inc. 1-11a, 2-13, 3-14, 1-15 and one ¼″ Pl. S. Lock Washer (3/32″x1/16″) (Tin Pl.)	8385–2754
235888	**11a**	**Contact Spring Complete** (without Nuts and Washers)	8385–2754
235885	**12**	**Insulation**	8750–3114
29101	**13**	**Nut**	8109–193
29102	**14**	**Washer**	7828–139
127260	**15**	**Nut**	8109–194
	16	**Terminal Post with Nuts and Washers** (Inc. 1-16a, 2-13, 3-14 and 1-19)	12451–
199852	**16a**	**Terminal Post Only**	8094–2207
	17	**Terminal Post with Nuts, Washers and Bushing** (Inc. 1-18a, 2-13, 3-14, 1-19, 1-20 and 4-21)	12451–
	18	**Terminal Post with Nuts, Washers and Bushing** (Inc. 1-18a, 2-13, 2-14, 1-19 and 1-20)	12451–
130593	**18a**	**Terminal Post Only**	8094–1192
29103	**19**	**Nut**	8109–194

Style "SL-6A" D. C. Electric Switch Lock

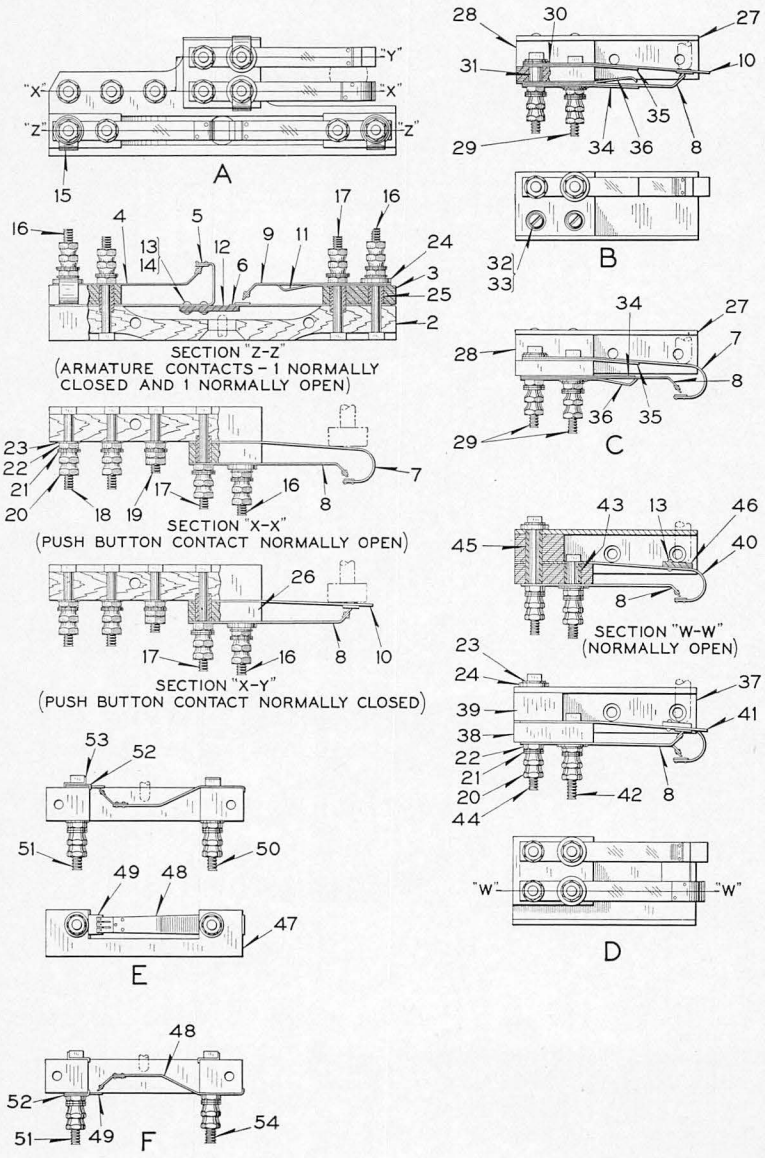
Detail Parts

Door-Operated and Armature Operated Contact Assembly

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
18470	**20**	**Bushing**	B–10270–1
1033	**21**	**Insulating Washer** ($\frac{1}{32}$″ thick) (4 required)	8078–76
172751	**22**	**Spring**	8385–2289
176511	**23**	**Spring**	8385–2309
172750	**24**	**Spring**	8385–2289



Push Button (Battery Saving) and Armature Contacts

D. C. Electric Switch Lock with Indicator

Detail Parts

Push Button (Battery Saving) and Armature Contacts

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Push Button (Battery Saving) and Armature Contacts Complete. Dwg. C-8118-9.

Piece	Ref.	Push Button Contacts	Armature Contacts
168211	**A**	One Normally Open	One Normally Open and One Normally Closed
169654	**Aa**	One Normally Closed	One Normally Open and One Normally Closed
172057	**Ab**	Two Normally Open	One Normally Open and One Normally Closed
173658	**Ac**	One Normally Open and One Normally Closed	One Normally Open and One Normally Closed
179678	**Ad**	Two Normally Open	

Piece	Ref.	Description	Drawing Reference
111449	***B**	**Push Button Contact Complete** (Normally Closed) (Battery Saving)	C–8118–6
111450	***C**	**Push Button Contact Complete** (Normally Open) (Battery Saving)	C–8118–6
131515	***D**	**Push Button Contacts Complete** (One Normally Open and One Normally Closed) (Battery Saving)	C–8118–6
111451	***E**	**Armature Contact Complete** (Normally Closed)	C–8118–6
111452	***F**	**Armature Contact Complete** (Normally Open)	C–8118–6
		*Required only as repairs to original design, view "Z" Plate E-5806.	
168479	**2**	**Terminal Board**	9968–1017
168478	**3**	**Terminal Board**	9968–1022
168483	**4**	**Contact Spring Complete**	8385–2264
168485	**5**	**Contact Spring Complete**	8385–2263

D. C. Electric Switch Lock with Indicator

Detail Parts

Push Button (Battery Saving) and Armature Contacts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
168481	**6**	**Contact Spring Complete**	8385–2262
110554	**7**	**Contact Spring Complete**	8385–1385
72680	**8**	**Contact Spring Complete**	8385–846
197419	**9**	**Contact Spring Complete**	8385–2264
72681	**10**	**Contact Spring Complete**	8385–847
197418	**11**	**Stop Spring**	8385–2309
168488	**12**	**Insulation**	8750–2431
54920	**13**	**Rivet**	10301–1
72876	**14**	**Washer**	7828–180
168489	**15**	**Connector**	7828–275
	16	**Terminal Post** with Nuts, Washers and Ins. Tube (Inc. 1-16a, 2-20, 2-21, 1-22, 1-23, 4-24 and 1-25)	12451–
131237	**16a**	**Terminal Post Only**	8094–1192
	17	**Terminal Post** with Nuts, Washers and Ins. Tube (Inc. 1-17a, 2-20, 2-21, 1-22 and 1-25)	12451–
118271	**17a**	**Terminal Post Only**	8094–1192
	18	**Terminal Post** with Nuts and Washers (Inc. 1-18a, 2-20, 2-21, 1-22 and 1-23)	12451–
130593	**18a**	**Terminal Post Only**	8094–1192
	19	**Terminal Post** with Nuts and Washers (Inc. 1-19a, 2-21, 3-22 and 1-23)	12451–
122782	**19a**	**Terminal Post Only**	8094–1192
29101	**20**	**Nut**	8109–193
29102	**21**	**Washer**	7828–139
29103	**22**	**Nut**	8109–194
29104	**23**	**Washer**	7828–138

D. C. Electric Switch Lock with Indicator

Detail Parts

Push Button (Battery Saving) and Armature Contacts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
1033	**24**	**Ins. Washer**	8078–76
197421	**25**	**Ins. Tube**	B–10270–1
168946	**26**	**Terminal Board**	9968–1023
43584	**27**	**Terminal Board Support**	C–8118–3
43630	**28**	**Terminal Board**	9968–230
	29	**Terminal Post** with Nuts, Washers and Ins. Bushing (Inc. 1-18a, 2-20, 2-21, 1-22, 1-23, 2-30 and 1-31)	12451–
28259	**30**	**Washer**	8078–494
43636	**31**	**Ins. Bushing**	B–10270–1
37764	**32**	**Washer**	7828–166
	33	**Machine Screw,** No. 14-24x1″ Fil. Hd. Bz.	
172750	**34**	**Reinforcing Spring**	8385–2289
172751	**35**	**Reinforcing Spring**	8385–2289
176511	**36**	**Reinforcing Spring**	8385–2309
131508	**37**	**Terminal Board Support**	10914–54
131509	**38**	**Terminal Block**	9968–703
131510	**39**	**Terminal Block**	9968–704
131512	**40**	**Contact Spring Complete**	8385–2000
131514	**41**	**Contact Spring Complete**	8385–2001
	42	**Terminal Post** with Nuts, Washers and Ins. Bushing (Inc. 1-18a, 2-20, 2-21, 1-22, 1-23, 2-24 and 1-43)	12451–
113602	**43**	**Ins. Bushing**	B–10270–1
	44	**Terminal Post** with Nuts, Washers and Ins. Bushing (Inc. 1–44a, 2-20, 2-21, 1-22, 1-23, 4-24 and 1-45)	12451–
143690	**44a**	**Terminal Post Only**	8094–1192

D. C. Electric Switch Lock with Indicator

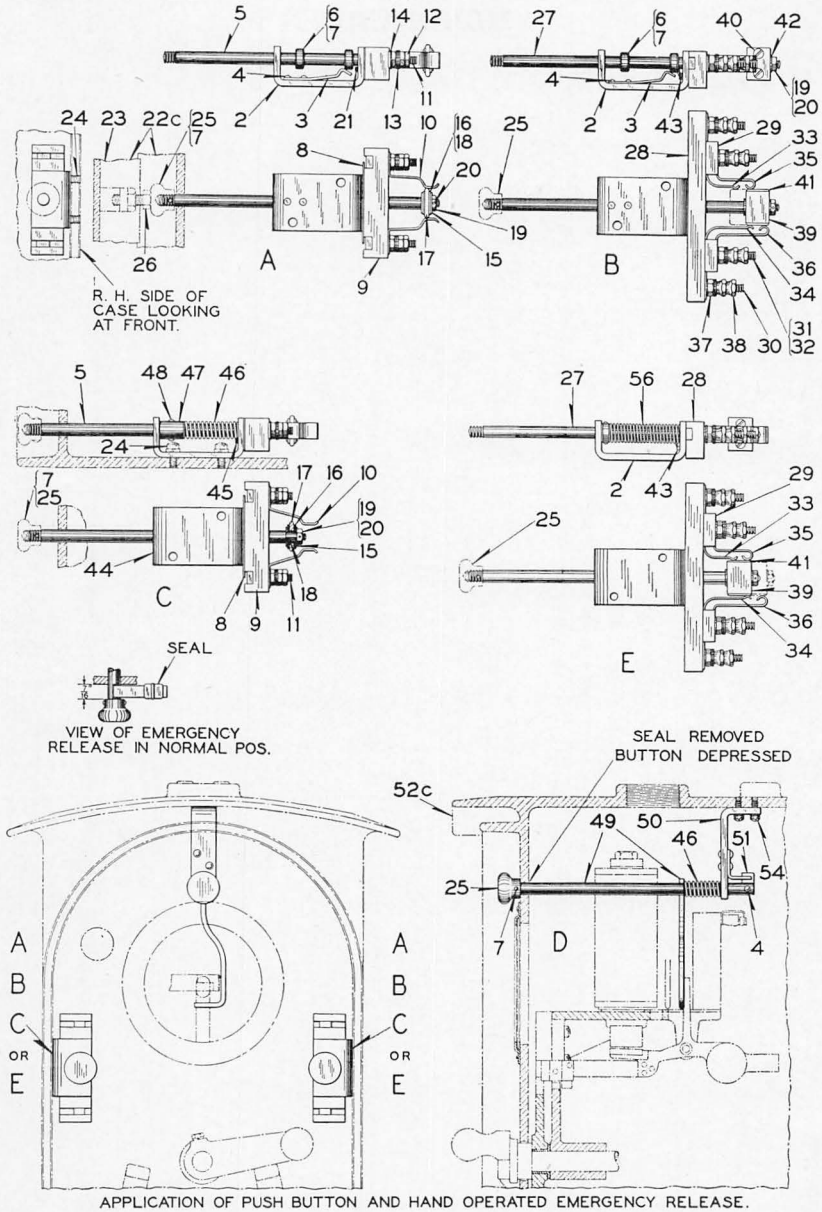
Detail Parts

Push Button (Battery Saving) and Armature Contacts

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
131517	**45**	**Ins. Bushing**	B–10270–1
131556	**46**	**Insulation**	8750–2166
43623	**47**	**Terminal Board**	9968–231
72662	**48**	**Contact Spring Complete**	8385–1202
43624	**49**	**Contact Spring**	8385–1203
	50	**Terminal Post** with Nuts, Washers and Lock Washer (Inc. 1-50a, 2-20, 2-21, 1-22, 1-23 and 1-53)	12451–
113978	**50a**	**Terminal Post Only**	8094–1192
	51	**Terminal Post** with Nuts, Washers and Lock Washers (Inc. 1-50a, 2-20, 2-21, 1-22, 1-23, 1-52 and 1-53)	12451–
43621	**52**	**Lock Washer**	8486–214
208518	**53**	**Lock Washer**	8486–405
	54	**Terminal Post** with Nuts, Washers and Lock Washer (Inc. 1-50a, 2-20, 2-21, 1-22 and 1-53)	12451–



APPLICATION OF PUSH BUTTON AND HAND OPERATED EMERGENCY RELEASE.

Manually Operated Push Button Circuit Controllers and Sealed Mechanical Emergency Release

D. C. Electric Switch Lock with Indicator

Detail Parts

Manually Operated Push Button Circuit Controllers and Sealed Mechanical Emergency Release

Parts shown on this Plate, if required, are to be specified on orders.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
189765	**A**	**Stick Push Button** with 1 Normally Closed Contact Complete as shown in Full Lines (For door and manual application, placed normal by closing of door and reverse by manual operation)	B–9918–57
219998	**B**	**Stick Push Button** with 1 Normally Open and 1 Normally Closed Contacts Complete as shown in Full Lines (For door and manual application, placed normal by closing of door and reverse by manual operation)	B–9918–80
105692	**C**	**Push Button** with Return Spring and 1 Normally Open Contact Complete as shown in Full Lines	B–9918–75
235145	**D**	**Sealed Mechanical Emergency Release** (Inc. 1-4, 1-7, 1-25, 1-46, 1-49, 1-50, 1-51 and 2-54)	C–8118–16
231568	**E**	**Push Button** with Return Spring and 1 Normally Open and 1 Normally Closed Contacts Complete as shown in Full Lines	B–9918–83
190038	**2**	**Support Bracket**	10914–640
190073	**3**	**Retainer Spring**	8735–805
54921	**4**	**Rivet**	10301–1
190078	**5**	**Operating Shaft**	12501–100
19901	**6**	**Collar**	8072–164
37789	**7**	**Pin**	8097–279
190084	**8**	**Insulation**	8750–2668
190069	**9**	**Contact Spring Board**	9968–464
190068	**10**	**Contact Spring**	8385–2413
	11	**Terminal Post** with Nuts and Washers (Inc. 1-11a, 3-12, 2-13 and 1-14)	12451–
122489	**11a**	**Terminal Post Only**	8094–1192

D. C. Electric Switch Lock with Indicator

Detail Parts

Manually Operated Push Button Circuit Controllers and Sealed Mechanical Emergency Release

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
29103	**12**	**Nut**	8109–194
29102	**13**	**Washer**	7828–139
29104	**14**	**Washer**	7828–138
939	**15**	**Washer**	7828–7
1033	**16**	**Ins. Washer**	8078–76
23466	**17**	**Operating Knob**	8112–52
23905	**18**	**Bushing**	B–10270–1
535	**19**	**Nut**	8109–1
97119	**20**	**Pin**	8097–568
	21	**Machine Screw,** No. 10-30x$\frac{5}{8}$″ Fil. Hd. S. (Cad. Pl.) with $\frac{3}{16}$″ Pl. S. Lock Washer ($\frac{3}{32}$″x$\frac{1}{32}$″) (Cad. Pl.) and Washer Ref. 21a.	
44999	**21a**	**Washer**	7828–206
	*22c	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by door. Lever Lug on Front Door extends from Middle to Full Reverse Positions permitting door to be closed before switch is returned to normal (Inc. 1-22g, 1-23 and 1-55 of this Plate and 1-4, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
	*22d	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by door. Lever Lug on Front Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed (Inc. 1-22g, 1-23a and 1-55 of this Plate and 1-4, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
	*22e	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by door and Sealed Mechanical Emergency Release. Lever Lug on Front Door extends from Middle to Full Reverse Positions; permitting door to be closed before switch is returned to normal (Inc. 1-22h, 1-23 and 1-55 of this Plate and 1-4, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–

D. C. Electric Switch Lock with Indicator

Detail Parts

Manually Operated Push Button Circuit Controllers and Sealed Mechanical Emergency Release

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	*22f	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by door and Sealed Mechanical Emergency Release. Lever Lug on Front Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed (Inc. 1-22h, 1-23a, and 1-55 of this Plate and 1-4, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
	*22g	**Case Only** arranged for extra Push Button Circuit Controller	C–8118–
	*22h	**Case Only** arranged for extra Push Button Circuit Controller and Sealed Mechanical Emergency Release	C–8118–
	*22j	**Case Only** arranged for Sealed Mechanical Emergency Release	C–8118–
190025	23	**Front Door** with Gasket Ref. 4a of Plate E-5807 and Bracket. Without Tap Bolt Ref. 26. Lug on Door extends from Middle to Full Reverse Positions permitting door to be closed before switch is returned to normal	C–8118–13
	23a	**Front Door** with Gasket Ref. 4a of Plate E-5807 and Bracket. Without Tap Bolt Ref. 26. Lug on Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed	C–8118–13
	24	**Machine Screw,** No. 14-24x$\frac{1}{2}$″ Fil. Hd. S. (Tin Pl.) with $\frac{1}{4}$″ Pl. S. Lock Washer ($\frac{3}{32}$″x$\frac{1}{16}$″) (Tin Pl.).	
190083	25	**Knob**	8235–167
	26	**Tap Bolt,** $\frac{3}{8}$″-16x1″ Hex. Hd. S. (Cad. Pl.) with $\frac{3}{8}$″-16 Hex. Jam Nut (Cad. Pl.).	
219984	27	**Operating Shaft**	12501–100
219985	28	**Terminal Board**	9968–1270
220092	29	**Ins. Block**	8750–2986

D. C. Electric Switch Lock with Indicator

Detail Parts

Manually Operated Push Button Circuit Controllers and Sealed Mechanical Emergency Release

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	30	**Terminal Post** with Nuts and Washers (Inc. 1-30a, 2-13, 1-14, 1-37 and 2-38)	12451–
199852	30a	**Terminal Post Only**	8094–2207
	31	**Terminal Post** with Nuts and Washers (Inc. 1-31a, 2-13, 1-14, 1-37 and 2-38)	12451–
130593	31a	**Terminal Post Only**	8094–1192
43726	32	**Ins. Bushing**	B–10270–1
220097	33	**Contact Spring**	8385–2682
220098	34	**Contact Spring**	8385–2682
220095	35	**Contact Spring**	8385–2681
220096	36	**Contact Spring**	8385–2681
127260	37	**Nut**	8109–194
29101	38	**Nut**	8109–193
220093	39	**Ins. Block**	8750–2987
	40	**Screw,** No. 8-36x$\frac{3}{8}$″ Flat Hd. Br.	
220094	41	**Contact Segment**	8429–254
73099	42	**Washer**	7826–66
	43	**Machine Screw,** No. 10-30x$\frac{5}{8}$″ Fil. Hd. S. (Tin Pl.) with Hex. Nut (Tin Pl.).	
211804	44	**Bracket**	10914–640
	45	**Machine Screw,** No. 10-30x$\frac{5}{8}$″ Fil. Hd. S. (Tin Pl.) with Washer Ref. 45a and No. 10 Pl. S. Lock Washer ($\frac{1}{16}$″x$\frac{3}{64}$″) (Tin Pl.).	
56349	45a	**Washer**	7826–180
38695	46	**Spring**	8124–112
211805	47	**Collar**	8072–646

D. C. Electric Switch Lock with Indicator

Detail Parts

Manually Operated Push Button Circuit Controllers and Sealed Mechanical Emergency Release

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
6006	**48**	**Pin**	8097–34
105695	**49**	**Shaft Complete**	12501–137
105699	**50**	**Bracket Complete**	10914–993
105696	**51**	**Stop**	11893–872
	***52c**	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by hand and Sealed Mechanical Emergency Release. Lever Lug on Front Door extends from Middle to Full Reverse Positions permitting door to be closed before switch is returned to normal (Inc. 1-22h and 1-55 of this Plate and 1-4, 1-5, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
	***52d**	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by hand and Sealed Mechanical Emergency Release. Lever Lug on Front Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed (Inc. 1-22h and 1-55 of this Plate and 1-4, 1-5a, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
	***52e**	**Case with Doors and Fittings.** Arranged for Sealed Mechanical Emergency Release. Lever Lug on Front Door extends from Middle to Full Reverse Positions permitting door to be closed before switch is returned to normal (Inc. 1-22j and 1-55 of this Plate and 1-4, 1-5, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
	***52f**	**Case with Doors and Fittings.** Arranged for Sealed Mechanical Emergency Release. Lever Lug on Front Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed (Inc. 1-22j and 1-55 of this Plate and 1-4, 1-5a, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–

D. C. Electric Switch Lock with Indicator

Detail Parts

Manually Operated Push Button Circuit Controllers and Sealed Mechanical Emergency Release

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	*52g	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by hand. Lever Lug on Front Door extends from Middle to Full Reverse Positions permitting door to be closed before switch is returned to normal (Inc. 1-22g and 1-55 of this Plate and 1-4, 1-5, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
	*52h	**Case with Doors and Fittings.** Arranged for extra Push Button Circuit Controller operated by hand. Lever Lug on Front Door extends from Normal to Full Reverse Positions; switch must be returned to normal and locked before door can be closed (Inc. 1-22g and 1-55 of this Plate and 1-4, 1-5a, 2-6, 2-7, 4-8 and 4-9 of Plate E-5807)	C–8118–
		*NOTE—When ordering Case with Doors and Fittings or Cases Only for repair the orders should specify the following: (a) Style of Lock ("SL-6" or "SL-6A") (b) Type of Lock (With Lock Stand or for Between Track Installation). (c) Type of Indicator (Semaphore, Illuminated or Non-Illuminated).	
	54	**Machine Screw,** No. 10-30x$\frac{1}{2}$" Fil. Hd. S. (Tin Pl.) with No. 10 Pl. S. Lock Washer ($\frac{1}{16}$"x$\frac{3}{64}$") (Tin Pl.).	
173357	56	**Coil Spring**	7770–476

STYLE MC-1 AND MC-1B MOTOR CAR INDICATORS

With the greatly increased use of motor car indicators during the last several years, particularly on the western railroads, there has grown a demand for an indicator of a design comparable to that of modern relays and especially applicable for this service. To meet this demand, the Union Switch & Signal Co. has developed the Style MC-1 and MC-1B (biased neutral) Motor Car Indicators. The biased neutral MC-1B differs from the conventional neutral MC-1 only in that the operating mechanism will respond to current of one polarity only. Designed to meet A.A.R. requisites for standard D.C. relays, the Indicator is a considerable improvement over previous indicators and offers numerous important advantages, including increased reliability and higher efficiency with minimum maintenance requirements. Its favorable operating characteristics and inherent safety features make it particularly suitable also for switch indicator service. Two dependent front and back contacts are provided for checking, indication or repeater circuits.

The Style MC-1 Motor Car Indicator is composed of a sealed operating unit housed in a sturdy, weatherproof outer case designed for mounting on a standard indicator post or bracket. The case has a clear ¼ inch thick acrylic plastic window in the front which affords an unobstructed view of the indicator aspects and is less subject to breakage than the plate glass used in previous indicators. A hinged door at the back of the case permits ready access to the operating unit and the inside of the case. Provision is made for the use of a padlock to prevent opening of the housing by unauthorized persons. The operating unit is positioned in the case on a shock absorber mounting and is readily removable for inspection or replacement in the field.

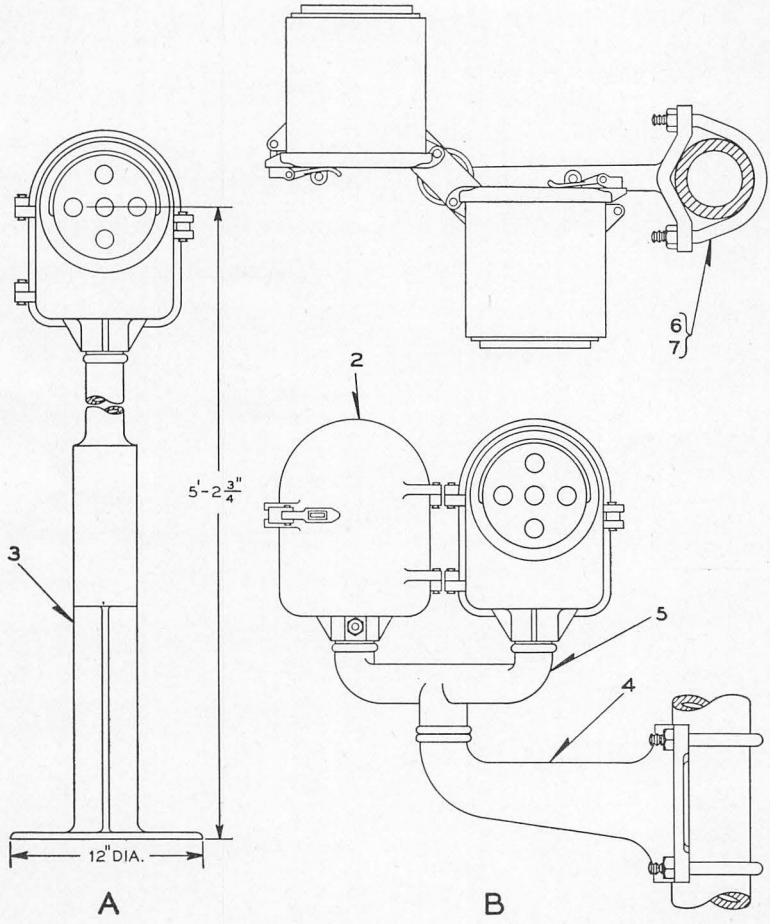
The operating unit developed for the Style MC-1 indicator utilizes the basic four-point Style DN-12 trunnionless relay structure but has an indicating element added to provide a visual indication for warning track forces, maintainers, and others using motor cars of the approach of a train. All of the reliability and safety features of the Style DN-12 relay are retained. The operating and indicating elements are combined into one integral unit enclosed in a sealed case having windows that readily permit visual inspection of the contacts, armature air gap, and indicator linkage. With this arrangement all internal components are amply protected against the entrance of dirt or other foreign material, and factory adjustments are protected against tampering. Furthermore, use of this sealed operating unit is also effective in eliminating trouble due to improper installation in the housing, loose pieces of wire or other objects inadvertently left in the housing, improper sealing of the wire entrance, or careless maintenance in the field.

The indicating element is mounted on the operating unit top plate and is actuated by the armature of the relay structure. Two types of indications are available, color position and position. In the color position type each indication is given by two colored discs, each more than one inch in diameter, spaced approximately 4 inches apart, with a black disc of the same diameter between them. The color and position of the discs displayed depend upon whether the indicator coils are energized or deenergized. With the indicator coils energized, the aspect is that of two green discs in a vertical line with a black disc between them. With the indicator coils deenergized, the aspect consists of two red discs in a horizontal line with a black disc between them. These colored discs are displayed against a white background, and with the black disc in the center the optical effect at a distance is that of a relatively wide band positioned horizontally or vertically. The position type employs the same principle as the color position indicator except the indication is obtained by the position of black discs against a silver background.

The red, green and silver discs are made of light reflecting material (Scotchlite) held between the two circular aluminum plates that form the indicator vane. This material readily reflects light from a flashlight or motor car headlight so that satisfactory day and night indications are provided.

Another important feature of the Style MC-1 Motor Car Indicator is that the operating unit is designed to the same A.A.R. specifications as standard relays. Contacts, binding posts, and operating elements are mounted on a top plate made of molded insulating material and are assembled with A.A.R. 3000 volt breakdown tests, thus assuring adequate protection against trouble due to lightning. The contacts are designed with standard relay contact openings. Front contacts are silver to silver-impregnated carbon while the back contacts are silver to silver. Modern relay coils are used which permit replacement without disturbing the adjustment of the indicator either mechanically or electrically.

The indicator is available with either a 40-ohm operating unit for series circuit operation or a 670-ohm operating unit for multiple circuit operation. Their operating characteristics are only slightly higher than those for Style DN-11 or Style DN-12 relays of the same resistance.

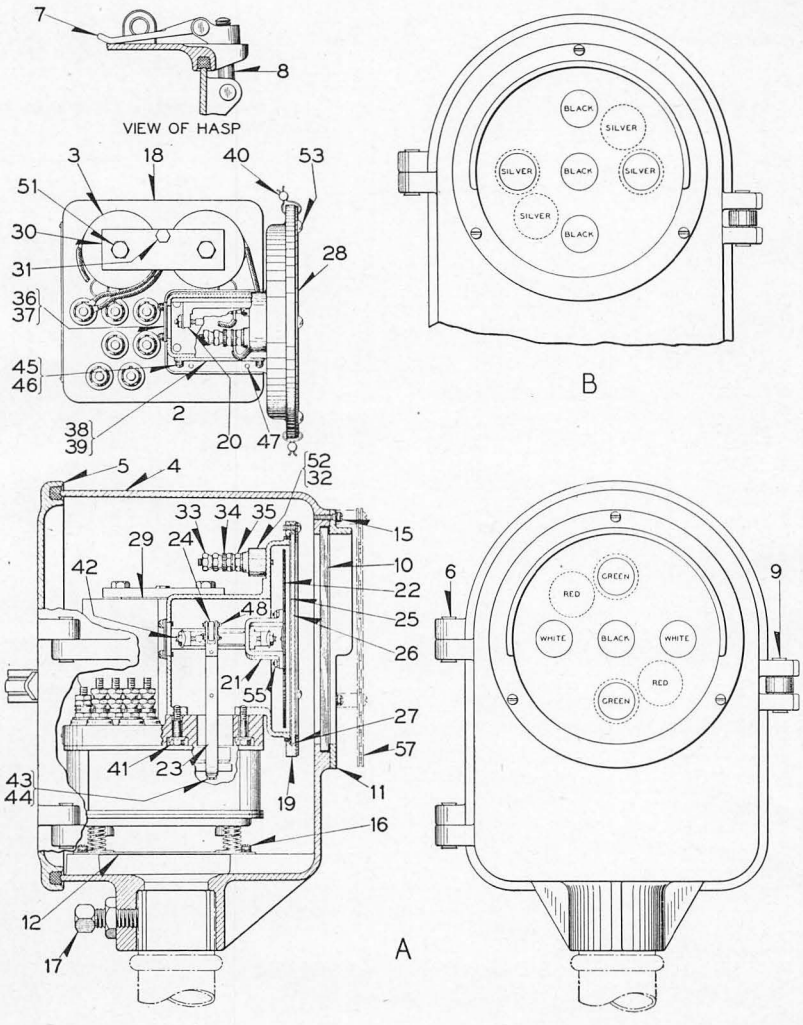


Style "MC-1" and "MC-1B" Motor Car Indicators

Style "MC-1" and "MC-1B" Motor Car Indicator Color Position & Position Types of Indication

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Motor Car Indicator and Mounting Post** (Orders should specify Indicator desired by referring to Plate E-5902)	
	B	**Motor Car Indicator and Brackets** for back-to-back mounting (Orders should specify Indicator desired by referring to Plate E-5902)	
	2	**Motor Car Indicator** (When ordering assemblies or details refer to Plate E-5902).....	C-16933-1
59248	3	**Post**.....	C-2009-1
55383	4	**Bracket**.....	C-8034-9
154711	5	**Bracket Complete** (Inc. Set Screw Ref. 5a).....	B-9273-1
	5a	**Set Screw,** ½″x1″ Cupped Point I. (C.N.50587)	
	6	**U-Bolt** Ref. 6c with ¾″ Hex. Nut (C.N.48026) and ¾″ Lock Washer (C.N.47543) for use with 3″ and 4″ Pipe	
	6a	**U-Bolt** Ref. 6d with ¾″ Hex. Nut (C.N.48026) and ¾″ Lock Washer (C.N.47543) for use with 5″ Pipe	
	6b	**U-Bolt** Ref. 6e with ¾″ Hex. Nut (C.N.48026) and ¾″ Lock Washer (C.N.47543) for use with 6″ Pipe	
55865	6c	**U-Bolt Only,** for use with 3″ and 4″ Pipe.....	8782-102
43931	6d	**U-Bolt Only,** for use with 5″ Pipe.....	8782-66
44199	6e	**U-Bolt Only,** for use with 6″ Pipe.....	8782-69
47106	7	**Filler Block** for use with 3″ Pipe.....	C-8034-2



Style "MC-1" and "MC-1B" Motor Car Indicators

Style "MC-1" and "MC-1B" Motor Car Indicator Color Position & Position Types of Indication

If Roundel Guard Ref. 57 as shown in dot and dash lines is desired, orders should so state.

For Motor Car Indicator with Mounting Post and Brackets refer to Plate E-5901.

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
	A	**Style "MC-1" Motor Car Indicator Complete** for Color Position Indication. Orders should specify resistance per pair of coils desired	C-16933-1
	Aa	**Style "MC-1B" (Biased Neutral) Motor Car Indicator Complete** for Color Position Indication. Orders should specify resistance per pair of coils desired	C-16933-1
	B	**Style "MC-1" Motor Car Indicator Complete** for Position Indication. Orders should specify resistance per pair of coils desired	C-16933-1
	Ba	**Style "MC-1B" (Biased Neutral) Motor Car Indicator Complete** for Position Indication. Orders should specify resistance per pair of coils desired	C-16933-1
275402	2	**40-Ohm Operating Unit Complete** for "MC-1" Motor Car Indicator. For Color Position Indication	D-2607-1
275403	2a	**670-Ohm Operating Unit Complete** for "MC-1" Motor Car Indicator. For Color Position Indication	D-2607-1
	2b	**40-Ohm Operating Unit Complete** for "MC-1B" (Biased Neutral) Motor Car Indicator. For Color Position Indication	D-2607-1
279838	2c	**670-Ohm Operating Unit Complete** for "MC-1B" (Biased Neutral) Motor Car Indicator. For Color Position Indication	D-2607-1
292024	2d	**40-Ohm Operating Unit Complete** for "MC-1" Motor Car Indicator. For Position Indication	D-2607-1
291851	2e	**670-Ohm Operating Unit Complete** for "MC-1" Motor Car Indicator. For Position Indication	D-2607-1
	2f	**40-Ohm Operating Unit Complete** for "MC-1B" (Biased Neutral) Motor Car Indicator. For Position Indication	D-2607-1
292933	2g	**670-Ohm Operating Unit Complete** for "MC-1B" (Biased Neutral) Motor Car Indicator. For Position Indication	D-2607-1

Style "MC-1" and "MC-1B" Motor Car Indicator Color Position & Position Types of Indication

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
275406	**3**	**Coil,** 20-Ohms	8133-365
144561	**3a**	**Coil,** 335-Ohms	8133-452
275392	**4**	**Case**	C-16934-1
275399	**4a**	**Case Complete** (Inc. Refs. 4 to 17 inclusive)	C-16933-1
275395	**5**	**Door Complete** (Includes Gasket Ref. 5a)	C-16934-2
	5a	**Gasket** for Door (C.N.67069)	
209948	**6**	**Pin**	B-10207-1
72832	**7**	**Hasp Complete**	8299-66
50126	**8**	**Eye Bolt**	8034-64
209949	**9**	**Pin**	B-10207-1
275369	**10**	**Glass Shield**	8163-370
275393	**11**	**Cover Glass Ring**	7632-254
275408	**12**	**Shock Absorber Complete**	12404-27
275391	**13**	**Wire Clamp** (Not Shown)	10914-2148
	14	**Machine Screw,** No. 10-32x¼" Fil. Hd. S. (C.N. 52297) (Tin Pl.) For attaching Wire Clamp to Case (Not Shown)	
	15	**Machine Screw,** No. 10-32x½" Fil. Hd. Br. (C.N. 51298) (N. Pl.) with No. 10 Plain S. Lock Washer (C.N.47733) (Tin Pl.)	
	16	**Machine Screw,** No. 10-32x⅜" Fil. Hd. S. (C.N. 522019) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N.47733) (Tin Pl.)	
	17	**Set Screw,** ⅝"-11x1-⅜" Sq. Hd. Cup Point I. (C.N. 50667) (Cad. Pl.) with ⅝"-11 Hex. S. Jam Nut (C.N.48018) (Cad. Pl.)	
275407	**18**	**Mechanism** for MC-1 Indicator (For details refer to Plate E-5904)	C-16934-4

Style "MC-1" and "MC-1B" Motor Car Indicator Color Position & Position Types of Indication

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
279984	18a	**Mechanism** for MC-1B Indicator (For details refer to Plate E-5904)	C-16934-4
275413	19	**Upper Case**	C-16934-3
275364	20	**Pivot Bracket**	8303-142
275373	21	**Pivot Crank Complete**	8192-447
275387	22	**Vane Complete** for Color Position Indication	10262-104
292027	22a	**Vane Complete** for Position Indication	10262-106
275381	23	**Operating Arm Complete**	10914-2150
275374	24	**Link**	8232-195
275377	25	**Face Plate** for Color Position Indication	10262-101
292026	25a	**Face Plate** for Position Indication	10262-105
275370	26	**Shield**	8163-370
275389	27	**Gasket**	8078-121
275375	28	**Roundel Ring**	7436-167
184680	29	**Coil Lock**	8735-784
142640	30	**Back Strap**	8162-221
137935	31	**Plug**	8098-1289
	32	**Terminal Block Complete** (Inc. 1-32a, 4-33, 8-34 and 4-35)	9968-
181832	32a	**Terminal Block** without Nuts and Washers	9968-1100
29101	33	**Nut**	8109-193
29102	34	**Washer**	7828-139
29103	35	**Nut**	8109-194
275404	36	**Cover Plate**	8163-371

Style "MC-1" and "MC-1B" Motor Car Indicator Color Position & Position Types of Indication

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

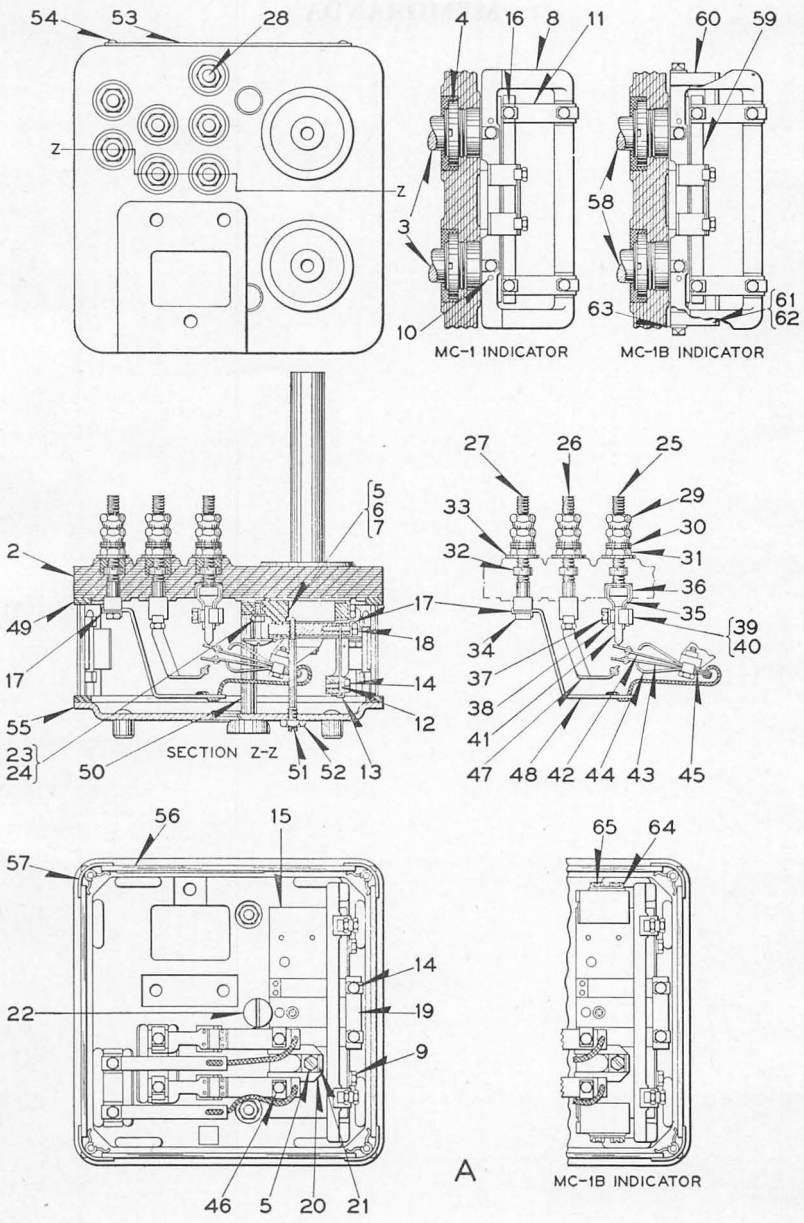
Piece	Ref.	Description	Drawing Reference
275396	**37**	**Gasket**	8078-1810
275405	**38**	**Cover Plate**	8163-371
275397	**39**	**Gasket**	8078-1810
	40	Seal Ref. 40a with Sealing Wire	
152702	**40a**	**Seal Only**	8988-33
	41	**Bolt** Ref. 41a with Washer Ref. 41b and Lock Washer Ref. 41c	
234815	**41a**	**Bolt Only**	8190-422
52335	**41b**	**Washer**	7828-184
275366	**41c**	**Lock Washer**	8486-428
	42	**Pivot Screw** Ref. 42a with Lock Washer Ref. 42b and Nut Ref. 42c	
157854	**42a**	**Pivot Screw Only**	8378-353
275365	**42b**	**Lock Washer**	8486-395
44230	**42c**	**Nut**	8109-281
131239	**43**	**Screw**	8098-845
275388	**44**	**Lock Washer**	8486-432
	45	Screw Ref. 45a with Washer Ref. 45b	
229570	**45a**	**Screw Only** (Drilled for seal wire)	8098-385
35203	**45b**	**Washer**	7828-35
	46	**Machine Screw,** No. 8-36x$\frac{5}{16}$″ Fil. Hd. S. (C.N. 52263) (Tin Pl.) with Washer Ref. 45b	
57497	**47**	**Dowel Pin**	8097-872
	48	**Pin** Ref. 48a with two Washers Ref. 48b	

Style "MC-1" and "MC-1B" Motor Car Indicator Color Position & Position Types of Indication

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
59957	**48a**	**Pin Only**	8097-837
138309	**48b**	**Washer**	7828-184
168826	**49**	**Washer** (Used under Coils) (Not Shown)	8078-1499
142777	**50**	**Tag** (Marked+) Used on Terminal Block (Not Shown)	8988-75
	51	**Cap Screw,** $\frac{5}{16}$″-18x$\frac{3}{4}$″ Hex. Hd. (C.N.50036) (Cad. Pl.)	
	52	**Machine Screw,** No. 10-32x$\frac{9}{16}$″ Fil. Hd. S. (C.N. 52466) (Tin Pl.) with No. 10 Plain S. Lock Washer (C.N.47733) (Tin Pl.) For attaching Terminal Block to Case.	
	53	**Machine Screw,** No. 10-32x$\frac{7}{16}$″ Rd. Hd. Br. (C.N. 51667) (N. Pl.)	
	54	**Machine Screw,** No. 10-32x$\frac{1}{2}$″. Flat Hd. Br. (C.N. 51048) (N. Pl.) For attaching Pivot Bracket to Case (Not Shown)	
	55	**Machine Screw,** No. 4-48x$\frac{3}{8}$″ Flat Hd. Br. (C.N. 51010) (N. Pl.) with No. 4-48 Hex. S. Elastic Stop Nut (C.N.48185) For attaching Vane to Pivot Crank	
	56	**Machine Screw,** No. 3-56x$\frac{1}{4}$″ Flat Hd. Br. (C.N. 51096) (N. Pl.) For attaching Face Plate to Case (Not Shown)	
281961	**57**	**Roundel Guard Complete** (Inc. 1-57a, 1-57b, 3-57c and 3-57d)	C-16934-10
281960	**57a**	**Front Ring Complete**	C-16934-10
281963	**57b**	**Back Ring**	7436-168
281965	**57c**	**Stud** (Replaces Screws Ref. 15 when Roundel Guard is used)	8114-1145
	57d	**Machine Screw,** No. 10-32x$\frac{1}{2}$″ Rd. Hd. Br. (C.N. 51668) (N. Pl.)	



Mechanism For Style "MC-1" and "MC-1B" Motor Car Indicators

Style "MC-1" and "MC-1B" Motor Car Indicator

Detail Parts

MECHANISM

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
275407	A	**Mechanism** with 2F-2B Low Voltage Contacts for Style "MC-1" Motor Car Indicator	C-16934-4
279984	Aa	**Mechanism** with 2F-2B Low Voltage Contacts for Style "MC-1B" Motor Car Indicator	C-16934-4
275362	2	**Top Plate** without Cores	C-16934-6
	3	**Pair Of Cores** for Style "MC-1" Indicator (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	C-16934-
104169	4	**Nut**	8265-359
142673	5	**Screw**	8098-1300
185878	6	**Lock Washer**	8486-405
196206	7	**Insulating Stop**	8750-2724
149977	8	**Armature Bracket**	8303-103
	9	**Screw** Ref. 9a with No. 8 Ph. Bz. Lock Washer (C.N.47709) (N. Pl.)	
195913	9a	**Screw Only**	8098-1300
57497	10	**Dowel**	8097-872
152710	11	**Armature Supporting Spring**	8735-667
5511	12	**Washer**	7828-2
164349	13	**Lock Washer**	8486-368
164348	14	**Screw**	8098-845
275368	15	**Armature Complete** for "MC-1" Indicator	8157-514
152834	16	**Locking Piece**	12538-29
134516	17	**Lock Washer**	8486-368
152807	18	**Screw**	8098-554

Style "MC-1" and "MC-1B" Motor Car Indicator

Detail Parts

MECHANISM

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
189525	**19**	**Plate**	11893-743
150113	**20**	**Contact Spring Support**	9968-849
149339	**21**	**Lock Washer**	8486-368
149076	**22**	**Back Stop Screw**	8098-549
1506	**23**	**Nut**	8109-12
178251	**24**	**Lock Washer**	8486-405
	25	**Binding Post** with Nuts and Washers (Inc. 1-25a, 2-29, 2-30, 1-31, 1-32 and 1-33)	12451-
115706	**25a**	**Binding Post Only**	8094-1192
	26	**Binding Post** with Nuts and Washers (Inc. 1-26a, 1-17, 2-29, 2-30, 1-31, 1-32, 1-33 and 1-34)	12451-
275415	**26a**	**Binding Post Only**	8094-2445
	27	**Binding Post** with Nuts and Washers (Inc. 1-27a, 1-17, 2-29, 2-30, 1-31, 1-32, 1-33 and 1-34)	12451-
131234	**27a**	**Binding Post Only**	8094-2125
	28	**Binding Post** with Nuts and Washers (Inc. 1-28a, 2-30, 3-31, 1-32 and 1-33)	12451-
199852	**28a**	**Binding Post Only**	8094-2207
29101	**29**	**Binding Nut**	8109-193
29102	**30**	**Washer**	7828-139
29103	**31**	**Clamping Nut**	8109-194
72948	**32**	**Nut**	8109-383
69705	**33**	**Washer**	7828-287
62977	**34**	**Screw**	8098-845
131245	**35**	**Front Terminal Post** (Contact Holder)	8094-2122

Style "MC-1" and "MC-1B" Motor Car Indicator

Detail Parts

MECHANISM

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
134400	**36**	**Lock Washer**	8486-371
	37	**Screw** with Nut and Washers (Inc. 1-37a, 1-17, 1-38, 1-39 and 1-40)	12471-
57996	**37a**	**Screw Only**	8098-845
20686	**38**	**Washer**	7828-108
173737	**39**	**Lock Washer**	8486-403
151836	**40**	**Nut**	8109-445
158043	**41**	**Contact Tip** (Sil. Imp. Carbon)	8341-476
189835	**42**	**Contact Spring Complete** (Silver Tip)	8385-2336
212952	**43**	**Contact Spring Complete** (Silver Tip)	8385-2376
156580	**44**	**Contact Spring Stop**	8385-2191
150140	**45**	**Lock Washer**	8486-367
150166	**46**	**Screw**	8098-550
131261	**47**	**Back Post Complete** (Silver Tip)	8094-2123
142643	**48**	**Terminal Connector** with Flexible Connector	8064-631
142674	**48a**	**Terminal Connector** without Flexible Connector	8064-631
152571	**48b**	**Flexible Connector**	10934-87
149034	**49**	**Gasket**	8078-1451
275411	**50**	**Screw Complete**	8098-1507
142642	**51**	**Shipping Screw**	8098-1298
537	**52**	**Nut**	8109-1
275363	**53**	**Name Plate**	8225-1001
	54	**Screw,** No. 4-40x¼" Rd. Hd. (C.N.52620) (Tin Pl.)	

Style "MC-1" and "MC-1B" Motor Car Indicator

Detail Parts

MECHANISM

(Continued)

Order by Plate, Piece, Reference and Abbreviated Description Given in Heavy Face Type Only

Piece	Ref.	Description	Drawing Reference
149060	**55**	**Base** with Glass Shields, Shield Supports and Gasket	C-9078-14
149013	**55a**	**Base Plate Complete.** Includes Studs, Corner Posts and Ventilator	10937-6
142646	**56**	**Glass Shield**	8163-294
142653	**57**	**Shield Support Complete**	10932-29
	58	**Pair Of Cores** for Style "MC-1B" Indicator (Cores should be ordered in pairs so they can be ground to the same dimensions at our factory)	C-16934-
280451	**59**	**Armature Complete** for "MC-1B" Indicator	8157-520
274035	**60**	**L. H. Pole Piece**	8250-136
274036	**61**	**R. H. Pole Piece**	8250-136
269811	**62**	**Permanent Magnet**	12586-29
274041	**63**	**Clamping Plate**	9999-2418
268066	**64**	**Nut Lock**	8486-432
274040	**65**	**Screw**	8098-1506